APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	WM. SAUNDERS, C.M.G., LL.D.
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HORTICULTURIST	W. T. MACOUN
CHEMIST	F. T. SHUTT, M.A.
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HORTICULTURIST " " "	W. S. BLAIR
SUPT. EXPERIMENTAL FARM, BRANDON, MAN.	S. A. BEDFORD
" " " INDIAN HEAD, SASK.	ANGUS MACKAY
" " " AGASSIZ, B.C.	THOS. A. SHARPE

FOR

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APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, December 1, 1905.

SIR,—I beg to submit for your approval the nineteenth annual report of the work done, and in progress, at the several experimental farms.

In addition to my report, you will find appended reports from the following officers of the Central Experimental Farm:—From the Agriculturist, Mr. J. H. Grisdale; from the Horticulturist, Mr. W. T. Macoun; from the Chemist, Mr. Frank T. Shutt; from the Entomologist and Botanist, Dr. James Fletcher; from the Cerealist, Dr. C. E. Saunders, and from the Poultry Manager, Mr. A. G. Gilbert.

From the Branch Experimental Farms there are reports from Mr. R. Robertson, Superintendent, and from Mr. W. S. Blair, Horticulturist of the Experimental Farm for the Maritime Provinces, at Nappan, Nova Scotia; from Mr. S. A. Bedford, Superintendent of the Experimental Farm for Manitoba at Brandon; from Mr. Angus Mackay, Superintendent of the Experimental Farm for the North-west Territories, at Indian Head, and from Mr. Thomas A. Sharpe, Superintendent of the Experimental Farm for British Columbia, at Agassiz.

In these reports there will be found the results of many important and carefully conducted experiments in agriculture, horticulture and arboriculture, the outcome of practical and scientific work in the fields, barns, dairy and poultry buildings, orchards and plantations at the several experimental farms; also of scientific research in connection with the breeding of cereals and in determining their relative value; also of research work in the chemical laboratories bearing on many branches of agricultural and horticultural employment and of information gained from the careful study of the life histories and habits of injurious insects and the methods by which noxious weeds are propagated and spread, together with the most practical and economical

measures for their destruction. In the report of the Entomologist and Botanist will also be found particulars of the experiments and observations which have been made during the past year in connection with the Apiary.

The large and constantly increasing demand by the farmers of the Dominion for the publications issued from the experimental farms, the rapidly extending correspondence and the readiness shown by farmers everywhere to co-operate with the work of the farms in the testing of new and promising varieties of cereals furnish gratifying evidence of the desire for information and improvement among this class of the community, also of the high esteem in which the work of the farms is held. It is hoped that the facts brought together in the present issue will be found of much practical value to the Canadian farmer and fruit-grower, and that they may assist in advancing agriculture and horticulture in this country.

I have the honour to be, sir,

Your obedient servant,

WM. SAUNDERS,

Director of Experimental Farms.

To the Honourable,

The Minister of Agriculture,

Ottawa.

ANNUAL REPORT OF THE EXPERIMENTAL FARMS

REPORT OF THE DIRECTOR

(WM. SAUNDERS, C.M.G., LL.D., F.R.S.C., F.L.S.)

1905

Canadian farmers have been blessed with another bountiful harvest, and the crops gathered have been very satisfactory over almost the whole of the settled parts of the Dominion.

On the Pacific coast the hay crop, which is one of great importance in the coast climate of British Columbia, has been unusually large, and has been saved in good condition. Oats, probably the next largest crop in that province, have given a heavy yield of excellent grain. Barley, pease, Indian corn, and field roots have all done well. Wheat, which, however, occupies but a small area there has given a crop below the average, owing to the prevalence of the wheat midge *Diplosis tritici.*

The fruit crop, which is fast becoming an important one in that province, has on the whole been satisfactory. Apples, pears and plums have produced in most localities a medium crop, and in some districts the yield has been a heavy one. Small fruits of all sorts have done well.

The production of butter, also of poultry and eggs is increasing, and hop growing is being extended with profitable results.

In Alberta there is a large and rapidly increasing area devoted to spring wheat and oats. The cultivation of winter wheat is also being greatly extended, while barley and other useful crops occupy smaller areas. All these have given very satisfactory returns during the season of 1905. The beet sugar factory at Raymond, in Southern Alberta, has had a good season, and a large quantity of sugar beets of excellent quality has been worked. The dairy interests in Northern Alberta are also advancing, and a large quantity of butter has been exported during the past year. New settlers are flocking in to all those parts which are being opened up by railways, and this accession of population will soon result in a very large increase in the area of land under cultivation.

The crops in Saskatchewan have never been better. Many new districts have been opened up, and large crops of wheat grown in localities where a few years ago the land was passed over by settlers as unpromising for wheat growing. Throughout these western provinces grain this year of all sorts was excellent in yield and quality, and was practically all cut before frost occurred.

In Manitoba also a large harvest has been gathered of grain of high quality, which has given an enduring stimulus to business of all sorts, and placed farmers generally in a comfortable position. The larger part of the wheat harvested has graded No. 1 Northern, while oats and barley have given crops of unusual weight and quality. The stock and dairy interests are also making satisfactory progress.

In Ontario the hay has been an unusually heavy crop, well above the average. The same may be said of fall and spring wheat, oats and barley, all of which are now important crops in this province. Field roots and Indian corn have given about an average return.

Pastures have made fair to good growth during the summer and fall, and all classes of live stock are in good condition. Apples have been a medium crop and have commanded good prices, while pears, plums, peaches and grapes have yielded well.

In the western counties of Quebec, where the rainfall has been sufficient, hay has yielded abundantly, and owing to the rich pasturage the dairy industry has flourished, and field crops of all sorts have given satisfactory returns. The eastern counties have suffered somewhat from drought, and there the crops have been lighter and the dairy output has been lessened owing to inferior pastures.

In the Maritime Provinces the hay crop as a whole is said to have been above the average, while oats have given a fair average return; wheat and barley also have done well. The early part of the season was cold and wet, and seeding was delayed. Later the weather was very favourable and crops matured rapidly. In September dry weather set in, which prevented the usual growth in field roots and the drought brought many crops which promised to be heavy down to an average or less than an average yield.

In the fruit producing districts the apple crop was a very fair one, the fruit was large and of excellent quality and has realized good prices.

Upon the progress of farming in all sections of Canada the experimental farms continue to exercise a weighty influence. The results of nineteen years of ceaseless inquiry into the needs of farmers in all parts of the country has resulted in the accumulation of volumes of information and experience which are placed within reach of all who need them. Instruction and information have been given out on every hand covering every branch of agriculture and horticulture. Reports and bulletins have been sent in thousands and tens of thousands, in response to inquiries from earnest seekers after information from all parts of the country. The knowledge acquired by long experience, close observation and careful study has been spread over the whole Dominion, and none need dwell in ignorance as to the best methods to adopt to render their work successful. Correspondence with farmers has been encouraged and many thousands of letters have been written by the officers of the farms in response to inquiries on special subjects. Many meetings of farmers held in the different provinces of the Dominion have been attended by farm officers, and opportunities afforded of bringing under the direct notice of many farmers some of the more important aspects of the work carried on at the several experimental farms.

Thus, Canadian farmers are growing in intelligence and becoming more resourceful and successful in their work, while the stranger coming among us is helped in many directions with information as to the best way of overcoming difficulties and of directing his energies along profitable lines.

THE GROWING OF WINTER WHEAT IN ALBERTA.

The recent remarkable increase in the quantity of winter wheat grown in the province of Alberta is a subject of much interest and is claiming the attention of grain growers and millers in all parts of the western country. In the Annual Report of the Experimental Farms for 1901, when giving an account of a visit paid during August of that year to the district lying between Cardston and Pincher in Southern Alberta, I said, 'Notwithstanding its high elevation of 3,000 to 3,500 feet the climate is such that winter wheat is grown in many localities quite successfully. This now forms an important crop both at Cardston and Pincher, many of the farmers reaping from 30 to 40 bushels per acre. The variety chiefly grown at Cardston is a beardless red-chaff wheat known as Odessa, that most grown at Pincher is a bearded wheat the name of which has been lost.'

At that time no very large area was occupied by this crop, and with many farmers spring wheat was preferred and the cultivation of winter wheat had scarcely passed the experimental stage. Since then the acreage under this crop has much increased, and the growing of winter wheat become much more general, especially in the Lethbridge, Macleod and Pincher districts.

A statement as to the area under winter wheat and the yield of grain per acre appeared for the first time in the Annual Crop Report for the North-west Territories for 1903, in which it was stated that this crop occupied 3,440 acres and had given a total yield of 82,418 bushels. In 1904 the acreage was increased to 8,296 and the total crop to 152,125 bushels. The returns for 1905 are not yet available, but there is no doubt that they will show a much larger proportionate increase. While the total crop of winter wheat in Alberta in 1904 is far exceeded by spring wheat, it must be borne in mind that in some of the districts of Southern Alberta, where only a limited area of land is under cultivation, winter wheat formed that year more than one-third of the entire wheat crop, and there is little doubt that the returns for 1905 will show a much larger proportion of winter wheat.

INTRODUCTION OF SEED OF SUPERIOR QUALITY.

During the past two or three years, a variety of wheat known as Turkey Red has been introduced and is fast coming into general cultivation in Alberta. Much of the seed sown last year was brought from Kansas, where it is commonly grown. It was brought in by the Canadian Pacific Railway and supplied to the farmers at cost. Turkey Red is a wheat of high quality, probably the best in this respect of all the winter wheats. It is a bearded variety with rather a short head, and does not look as if it would be very productive, and in Ontario it has the reputation of being a light yielder. In Alberta this variety stools very freely, often producing from five to seven heads from a single kernel, and its general productiveness has been a matter of surprise to many. Samples we have had, brought from Kansas, have shown the kernel to be small and thin, with a weight per bushel of 60 to 61 lbs., while in samples grown in Alberta, the kernels have been much more plump and brighter in colour, with a weight per bushel of 64 lb. and over. This wheat is a favourite with millers in Kansas, and there is no doubt it will make excellent flour.

A TOUR OF INVESTIGATION.

With the object of inquiring more fully into the agricultural conditions and possibilities of the western part of southern and northern Alberta, having especially in view the production of winter wheat, a visit was paid during the past season to different parts of that province in company with Mr. A. Mackay, Superintendent of the Experimental farm at Indian Head, Sask.

We arrived at Calgary August 27, when we called on Mr. J. S. Dennis, Superintendent of Irrigation for the Canadian Pacific Railway, from whom we obtained much valuable information, especially with regard to the progress of irrigation in Alberta. Through the courtesy of Mr. Dennis we were shown over the irrigation works of the Canadian Pacific Railway, within ten or twelve miles of Calgary, and had the opportunity of seeing the great progress which has been made there. It is expected that when this gigantic undertaking is completed, that the irrigation ditches will distribute water sufficient to irrigate about one million acres of land. It is difficult to realize the wonderful change this will bring about over a large part of the area lying between Calgary and Medicine Hat and when the irrigated land becomes saturated with sufficient water this will no doubt bring about more favourable conditions of moisture for the growing of crops on adjoining lands too high to be reached by the flowing streams.

JOURNEY THROUGH SOUTHERN ALBERTA.

On August 29 we left Calgary and proceeded southward. North of DeWinton a few fields of wheat were seen from the railway and from Okotoks to High river, a large number of fields were in view. High river was our first stopping place, and here we drove about 50 miles over the country and visited several farms.

HIGH RIVER AND VICINITY.

Mr. R. H. Robertson, High River P.O., had 47 acres of Turkey Red wheat which at this date, August 30, was all cut and threshed. The sample was an excellent one, plump and heavy, and the crop was estimated at from 40 to 44 bushels per acre. Mr. Robertson cut his Turkey Red wheat August 15. He also had a fine field of spring wheat, White Fife, which was cut September 1.

The estimates of crops given throughout this narrative are those of the growers, the correctness of which we had no means of accurately testing, but from what we saw of the wheat under different conditions, while still standing, of the appearance and bulk of the grain when threshed, and of the character of the stubble we regarded the estimates given of the crops on the fields we visited as approximately correct.

Mr. Wm. Thompson, High River, P. O., had 27 acres Turkey Red, estimated yield 35 to 40 bushels per acre. Sowed only one bushel of seed per acre, sown August 15, 1904; cut August 20, 1905. He was threshing at the time of our visit and the grain was a fine sample. He also had a large oat crop which he expected would give from 80 to 90 bushels per acre.

Mr. R. D. Brown, High River, P. O., had 60 acres Turkey Red. He sowed 1¼ bushels per acre on August 15, 1904, and it was cut August 15, 1905. Threshing was in progress August 30. Estimated crop, 40 bushels per acre.

Mr. Gilman, Okotoks, P.O., had 20 acres of winter Wheat, Dawson's Golden Chaff mixed with some Tenessee Giant. This was sown July 26, 1904, and harvested August 19, 1905. The grain was not then threshed, but he expected to get 30 bushels per acre.

Mr. A. Clayton, High River, had 30 acres of winter wheat from which he was expecting 35 bushels per acre.

South of High River, especially from Stavely to Claresholm, many good sized fields were seen under crop and considerable quantities of land were ploughed and ready for seeding.

CLARESHOLM TO MACLEOD.

Claresholm was our next stopping place, where we had another long drive of 50 miles or more before reaching Macleod.

Mr. Robert Pearson, Claresholm, had a large field of winter wheat, which promised well. He was cutting this at the time of our visit and expected it to average over 30 bushels per acre.

Mr. George Hartman, near Claresholm, had 200 acres of winter wheat which was all cut and stacked, but none of it had then been threshed.

From Claresholm to Leavings there were many large fields of winter wheat, and still larger areas sown or ready for sowing, and similar conditions prevailed from Leavings to near Macleod. In this district many large fields of winter wheat were seen, mostly in stook.

Mr. Fred. Garrow, of Cutbanks, had 33 acres of winter wheat which were said to have given him 1,350 bushels in all.

Mr. Grady, 18 miles west of Macleod, had 80 acres of winter wheat which was sown in October, 1904, and cut in the middle of August, 1905. This farm is at an elevation of about 4,000 feet above sea level. The crop was excellent and the grain matured well.

Taylor Bros., 7 miles north of Macleod, had a large field of winter wheat which was all cut and in stook by August 15. He started cutting August 4.

Mr. J. McNaught, 12 miles from Macleod, had 250 acres of wheat, some of which was winter, but most of it was spring wheat.

Mr. Miller, of this district had 50 acres of winter wheat estimated to give 30 bushels per acre.

In the Willow Creek district, 10 miles north of Macleod, Thompson Bros. had over 400 acres of spring wheat, Red Fife, which was then being threshed and was expected to give 25 bushels per acre.

Mr. Lee Evans, 3 miles east of Macleod, had 140 acres under winter wheat, mostly Turkey Red, with some Golden Chaff, which was cut during the first week in August, and was expected to give 25 bushels to the acre.

Mr. Peter Rohlig, Macleod, had 6 acres of winter wheat, Turkey Red, said to have yielded him 56 bushels per acre.

Mr. J. Robert, Macleod, is said to have threshed 500 bushels of good winter wheat, from 10 acres.

Mr. Hayter, of this district, had 200 acres of winter wheat, which is said to have given him an average of 33 bushels per acre.

Mr. Peter Roberts, 9 miles south of Macleod, had six acres of Turkey Red, which gave him 300 bushels of fine wheat.

LETHBRIDGE TO CARDSTON.

From Macleod we went to Lethbridge and visited some farms in that neighbourhood.

Richard G. Watkin had 40 acres of spring wheat, Red Fife, which was just about ready for cutting and looked very promising, this would probably give him from 30 to 35 bushels per acre.

Seven miles from Lethbridge Mr. C. Magrath had 100 acres of Turkey Red. This was sown in August, 1904, and at the time of our visit had been threshed and sold. The yield was 17 bushels per acre. A sample of this wheat was procured, it was very fine and plump and weighed 64 pounds per bushel. This field was on high land, and in this locality the weather was unusually dry and the crop had suffered from drought, which had reduced the yield.

Nine miles from Lethbridge, also on high land, was a very large field said to contain two thousand acres, which seemed to be well prepared. This belonged to Silver and Carman, and at that time was nearly all sown, one seeder only was working at one end of the field to finish it. The ploughing in this case was done in the ordinary way.

Nearly adjoining this was another large field said to contain 500 acres also prepared for winter wheat. This had been broken by a steam plough and seemed to be worked up very evenly.

In travelling over the country from Lethbridge to Cardston by rail many fields of winter wheat were seen, but there was not much opportunity of visiting individual farms.

Mr. T. J. Smellie, of Raymond, came from Idaho one and a half years ago. He had this year 1,300 acres of winter wheat, all Turkey Red, which averaged about 15 bushels per acre. He had expected a larger yield but the very dry weather which preceded harvest there had cut the crop short. He expected to finish seeding 1,000 acres during September. Mr. Smellie grows principally winter wheat, and inclines to the opinion that the Odessa is more profitable than the Turkey Red.

Mr. W. L. Thompson had about 1,700 acres in the Spring Coulee district, chiefly Turkey Red, with some Odessa. Mr. Thompson's wheat was cut and threshed and is said to have averaged from 15 to 20 bushels per acre. We were informed that there

were in all about 20,000 acres of wheat in this district, chiefly winter sorts. One elevator was built at Spring Coulee, and a second one nearly built which would be ready in time to receive the crop. Seven elevators in all have been built along this line.

ABOUT PINCHER AND COWLEY.

The next part visited was the district about Pincher and Cowley along the line of the Canadian Pacific Railway towards the Crow's Nest Pass.

At Pincher we saw the wheat fields of Mr. Wm. R. Dobbie. He has 1,170 acres of winter wheat, about 550 of Turkey Red, 200 of Odessa, and the remainder mixed bald and bearded wheats. One field of Turkey Red examined we estimated at 30 to 35 bushels per acre. One part of his crop which had been sown late was lighter and would not probably give more than 15 to 20 bushels per acre.

Mr. G. W. Buchanan, of Pincher, had 300 acres of winter wheat, and many other farmers in the district from 50 to 100 acres or more. Most of the land in this part of the country has been fenced in, and nearly all the homesteads have been taken within reasonable distance of railways, and much additional land held for sale has been purchased by incoming settlers. In driving about this neighbourhood, and from Pincher to Cowley, large quantities of winter wheat were seen in stook covering many hundreds of acres, also many fields of recently sown grain.

At Cowley Mr. Bryce Miller had 110 acres Odessa and Turkey Red. His wheat was cut on August 15.

Mr. J. E. Davison had 50 acres of winter wheat near the station, and many other fields large and small could be seen in the distance.

BEST TIME FOR SOWING, &C.

Much difference of opinion was expressed by the farmers we visited as to the best time to sow winter wheat in Southern Alberta, but judging from the results seen it would appear safer as a rule to sow on well prepared land from the last week in August to the middle of September.

We did not hear of any injurious insects affecting the winter wheat crop, but there was a good deal of smut in the grain in some localities. Where this occurs the grain is considerably lessened in value, and as this disease is so easily prevented by treating the seed with copper sulphate, bluestone, (one pound dissolved in three gallons of water and sprinkled on 10 bushels of grain a few hours before sowing) no farmer should neglect to take this precaution.

With regard to the time of ripening, the winter wheat in Southern Alberta matures on an average about ten days earlier than the spring varieties. Most of the wheat thus far referred to was grown on land which five years ago was considered fit only for grazing and with one or two slight exceptions was all grown without irrigation.

VISIT TO NORTHERN ALBERTA.

In pursuance of this investigation we visited also the northern part of the province from Calgary to Edmonton and found more or less winter wheat being grown at many different points, although the total area under this crop in Northern Alberta is as yet relatively small.

In the suburbs of Calgary Mr. Wm. Pearce had a few acres of winter wheat sown this season which had made strong growth and looked promising.

Fields of winter wheat varying in size were seen from the train in many different places. Some were in stook, others but recently sown and well up. Fields of this crop were most numerous from Crossfield to Olds. In a drive taken through the district

surrounding Innisfail, considerable quantities of wheat were seen, some of it winter sorts. In a similar drive about Red Deer several fields of winter wheat were noticed.

Mr. Joseph W. Smith, Red Deer, P.O., had 18 acres of winter wheat which gave him 51 bushels per acre. We saw this wheat, which was very good and plump.

Another farmer a short distance from Red Deer sowed three bushels of Turkey Red wheat on a little less than three acres of land and threshed 151 bushels. This was the first experiment with Turkey Red in that locality.

In travelling from Blackfalds to Lacombe, one large field of winter wheat was seen recently sown and well up, and another large field in stook near Lacombe. During a drive in that neighbourhood other fields were seen.

While in Edmonton two days were occupied in driving about the country, but not much winter wheat was seen there. Had time permitted us to visit a larger number of farmers in Northern Alberta we should no doubt have seen many more fields of this grain.

In the annual report of the Department of Agriculture for the North-west Territories for 1904, the total area of winter wheat grown that year in the several districts included in that part of the province we visited is given as follows:—

District No. 12—Edmonton, Strathcona and Wetaskiwin: Winter wheat 47 acres; average crop, 13·23 bushels per acre.

District No. 13—Red Deer, Lacombe and Ponoka: Winter wheat, 344 acres; average crop, 30·24 bushels per acre.

District No. 14—Innisfail, Olds and Didsbury, including the country adjacent to the Calgary and Edmonton railway from Carstairs to Penhold: Winter wheat, 915 acres; average crop, 21·95 bushels per acre.

From these figures it will be seen that winter wheat is being tested over a large area in Northern Alberta, but it does not yet occupy that prominent position as a crop which it does in the southern parts of the province.

The results of the experiments which have been tried seem to show that the climatic conditions prevailing in Northern Alberta are favourable for the growth of winter wheat; and if further experiments confirm the idea now prevailing that there is a gain of ten days in the time of ripening and a heavier average yield, these potent factors may lead to the cultivation of this grain in the north in much larger quantities. Spring wheat is of course grown successfully over the greater part of the settled country, and the acreage under this crop is rapidly increasing.

When considering the advantages attending the growing of winter wheat in Alberta it should be borne in mind that the land cannot be used so advantageously as in the case of spring wheat. Only one crop of winter wheat can be had in two years, unless an early spring crop be grown, such as oats or mixed grain cut green for feed early enough to admit of the land being ploughed in time for the sowing of winter wheat. Spring grain might of course follow winter wheat, to be succeeded by summer fallow, which would give two grain crops in three years.

In carrying out this investigation a large area of country has been covered, involving over 800 miles of railway travel and over 300 miles by vehicle.

EXPERIMENTS IN GROWING FARM CROPS IN THE YUKON.

With the object of gaining some information as to the agricultural possibilities of some parts of the Yukon Territory, a course of experiments was planned in consultation with the Comptroller of the Royal North-west Mounted Police, who has very kindly co-operated with me in this matter. He has given directions for the proper distribution of the material sent, and both the officers and men of the police force deserve many thanks for the kindly interest they have taken in this work.

The packages of grain, grass seeds and potatoes were forwarded from Ottawa on April 18, 1905, but owing to the lack of mail facilities for carrying packages in that distant region during the winter months they did not reach Dawson until early in June which was too late for uniform success in that climate.

A part of the material forwarded for test was left at White Horse in charge of the commanding officer, Sup. A. E. Snyder, who received the samples there about the middle of May.

LIST OF THE SAMPLES FORWARDED.

8—1-lb. bags Brome Grass Seed.

8—1-lb. bags Western Rye Grass.

8—1-lb. bags Timothy.

8—1-lb. bags Hungarian Grass.

8—5-lb. bags wheat (two each Early Riga, Ladoga, Preston and Stanley).

8—4lb. bags oats (four of Improved Ligowo and two each of Welcome and Tartar King).

8—5-lb. bags barley (four of Mensury and two each of Odessa and Champion).

10—3-lb. bags potatoes (five each of Rochester Rose and Vick's Extra Early).

The following explanations and instructions were sent with the samples:—

'In sending the samples above enumerated provision has been made for testing them at eight or ten different points. The Brome and Western Rye grasses are both very hardy perennial sorts. The Timothy is not so hardy but is also a perennial and will be useful for a comparative test. The Hungarian grass is a variety of Millet, it is an annual which matures very early, and it will I hope be found useful as a forage crop.'

'The grasses should be sown as early as practicable. They may be sown broadcast and covered by hand raking or in rows seven or eight inches apart. If convenient it may be well to try both methods. Where weeds are prevalent, the plots can be more easily kept clean where grass seed is sown in rows. Where plots are allowed to become overgrown with weeds the crops are much injured thereby, and the yields are usually small.

'All the varieties of grain sent are early ripening sorts, and, hence, among the most promising for testing in the Yukon country. They should be sown as early as the land is in condition to be worked, and may be sown broadcast or in drills. If sown broadcast the land should be subsequently raked until the seed is well covered; if in rows the seed should be buried to a depth of two inches. Each sample of grain sent is sufficient to sow one-twentieth of an acre, a plot 33 by 66 feet. The quantity of grass seed in each bag will sow a similar sized plot.

'The varieties of potatoes sent are both extra early sorts. They are also productive and of excellent quality. In preparing them for planting they should be cut so as to have from two to three eyes in each piece, or set, and planted in rows 2½ feet apart, and the sets placed about a foot apart in the rows and covered with about four inches of soil.'

Reports of the results obtained from the planting of these samples were received from the Assistant Commissioner at Dawson, T. G. Moore, commanding officer for the Yukon Territory, also from Supt. A. E. Snyder, commander at White Horse, as follows:—

SESSIONAL PAPER No. 16

REPORT ON SEEDS SUPPLIED BY THE EXPERIMENTAL FARM, DEPARTMENT OF AGRICULTURE, SOWN IN YUKON TERRITORY DURING SEASON OF 1905.

Tested by.	Name of Seed.	Date of Planting.	Date of Report.	Report of Grower.
Wm. Horkan. ..	Mensury barley.....	13–6–1905	18–8–1905	Sown in new ground, well worked, and is doing well, but was planted too late for perfect maturity this season.
"	" " .... (Seed received 1904.)	23–5–1905	18–8–1905	I planted the same seed in the Government House garden and it ripened well and will be ready for harvest in one week more, or about 13 weeks from seed to sickle. Excellent for the Yukon either for hay or grain, but should be planted early.
"	Odessa barley.....	15–6–1905	18–8–1905	Notwithstanding late sowing and continued dry weather in June and July it has grown vigorously but can hardly ripen perfectly this season. If sown in May or early in June I believe this would be a useful and profitable variety for this climate.
"	Timothy grass	12–6–1905	18–8–1905	Sown in Administration lawn separately and mixed—has done remarkably well, was cut four times and is now refreshing to look at. Well adapted for lawn, pasture and meadow in the Yukon.
"	Brome grass.....	12–6–1905	18–8–1905	Sown in Government House lawn separately and mixed with other grasses and in all cases has proved a vigorous grower. A good hay and field grass for this climate.
"	Hungarian grass....	12–6–1905	18–8–1905	Sown in Government House grounds, has done well, was cut three times and is now growing vigorously. A useful grass for this climate.
"	Western Rye grass..	12–6–1905	18–8–1905	Sown on Government House lawn in partial shade. Growth vigorous and very satisfactory.
"	" " ..	13–6–1905	18–8–1905	Sown in Administration grounds separately and mixed with other grasses and in each case has done well and is now verdantly and vigorously growing. Well adapted for this climate.
"	Welcome oats.....	15–6–1905	18–8–1905	Good vigorous grower, but sown too late for this season's harvest. It is now doing well and will be an excellent crop for the Yukon if sown early as frost will permit.
"	Impr'd Ligowo oats.	15–6–1905	18–8–1905	Growing well and promising good returns, but too late for this season's harvest. A good hardy oat that should be planted early.
"	Stanley wheat	15–6–1905	18–8–1905	Sown in new ground, well worked. Is growing nicely and looking well, but too late for practical results this year. I have reserved some of the seed for early planting next season.
"	Preston wheat.....	15–6–1905	18–8–1905	Growing vigorously and full of promise, but too late to mature before frost. I have reserved some of the seed for next season's early sowing.
"	Rochester Rose potatoes.	12–6–1905	18–8–1905	A good strong vigorous grower; stalks stout and well shaped; tubers of good size and maturing well considering the very late sowing. I think it will be an excellent variety for early planting.
"	Vick's Extra Early potatoes.	12–6–1905	18–8–1905	Stalk growth slender and small, tubers equally backward. Not so good, so far, as the Rochester Rose, sown in the same soil and under equal conditions. Seed received too late for satisfactory test.
P. Reitsma.....	Timothy grass.	8–6–1905	9–9–1905	Growth fairly good.
"	Western Rye grass..	8–6–1905	9–9–1905	Growth very poor.

REPORT ON SEEDS SUPPLIED BY THE EXPERIMENTAL FARM, &c.—*Continued.*

Tested by.	Name of Seed.	Date of Planting.	Date of Report.	Report of Grower.
P. Reitsma.....	Tartar King oats....	9-6-1905	9-9-1905	Growth splendid, will, I believe, mature if put in very early in spring.
"	Mensury barley....	9-6-1905	9-9-1905	Splendid growth until the heavy rain set in, would undoubtedly mature here if put in about the middle of May.
"	Vick's Extra Early potatoes.	7-6-1905	9-9-1905	Good growth, a heavy yielder. Did not mature on account of heavy frost in August. N.B.—Above named seeds were planted in rich sand and loamy soil, well manured in previous years. By planting a month earlier we can raise fairly good crops around Dawson.
Supt. Cuthbert..	Western Rye grass..	7-6-1905	5-9-1905	Both seeds were late in sowing, but have shown good growth and are suitable for this country.
" ..	Brome grass.....	.....	5-9-1905	" " " "
W. H. Dailey...	Timothy grass.....	24-5-1905	13-9-1905	Cut on August 20th; in flower for over two weeks before cutting.
" ..	Oats.....	24-5-1905	13-9-1905	Cut grain on August 29th.
" ..	Wheat.....	24-5-1905	13-9-1905	Killed by high water.
N. F. Hagel....	Vick's Extra Early potatoes.	....	14-8-1905	The plants are at this date looking exceedingly well and have been in bloom for about three weeks. I think they will mature and have no doubt of it had they been planted earlier.
"	Rochester Rose potatoes.	.....	14-8-1905	" " " "
W. R. Dubell...	....	.....	.....	As to results obtained from seeds furnished by the police department, I would like to state that after receiving the seeds and thinking over the matter, I came to the conclusion that neither the soil, conditions or season on which the seeds were received were suitable for a proper test of the same. As I am one of the pioneer farmers of the Yukon Territory, I am very much interested in this matter and I thought best to hold the seeds over for another year in order that I may be able to make what I consider a fair test for the same on an average piece of ground and sown at the proper time for seeding. I will hold the seeds over until the coming spring and will be pleased to furnish the department with specimens and details concerning their culture and growth. I would suggest that all experimental seeds be sent to Dawson during the fall or winter months as a short period of even ten days very often determines the success or failure of any crop of cereals or vegetables in this vicinity. From my experience I consider that any seeds planted after the date on which I received these packages for experiment (latter part of May) would be practically thrown away and in order to give them a fair test should be planted almost before the frost has left the ground. I shall be pleased to furnish the department with any information I can give, at all times.
J. P. Whitehouse	Vick's Extra Early potatoes.	4-6-1905	12 8-1905	Good robust growth; at present in blossom.
" ..	Rochester Rose potatoes.	4-6-1905	12-8-1905	Not quite as good a grower as Vick's but appears to make a better setting of tubers.
" ..	Early Riga wheat...	5-6-1905	12-8-1905	Made fairly good growth considering the time of sowing; well headed out but quite green at present.

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REPORT ON SEEDS SUPPLIED BY THE EXPERIMENTAL FARM, &c.—*Concluded.*

Tested by.	Name of Seed.	Date of Planting-	Date of Report.	Report of Grower.
J. P. Whitehouse	Mensury barley....	5-6-1905	12-8-1905	Made a good start, but frost on night of June 12th cut it down. At present just heading out.
" ..	Ligowo oats.....	5-6-1905	12-8-1905	Made very good growth ; stooled heavily and headed well ; straw about 3½ feet in length, quite green at this time.
" ..	Timothy grass.....	5-6-1905	12-8-1905	Some of this I seeded with the oats which has made a fairly good catch. The balance did not do so well seeded alone, owing to dry weather, is just showing up well now.
" ..	Hungarian grass....	5-6-1905	12-8-1905	Owing to drought did not start until late. Will not make any growth to speak of.
" ..	Brome and Western Rye grass.	5-6-1905	12-8-1905	The dry weather held these seeds back for a long time. Not a good catch and I don't think they will stand the winter. N.B.—All these seeds could have been planted by May 10th. At that time the soil was in better condition and the weather more favourable. The Timothy I think will stand the winter. Will report on yield of potatoes and on seeds next spring, if required.

Z. G. Wood,

Assistant Commissioner Comd'g R.N.W.M. Police, Yukon Territory.

REPORT FROM WHITE HORSE.

I have the honour to submit the following report, giving results of the seeds, obtained from the Experimental Farm, Ottawa, and planted at several places in this district this spring:—

GRASS.

Brome—This was planted at White Horse and Ten Mile Point. That at Ten Mile Point only attained a growth of three inches, being planted in new ground, and having no rainfall. That at White Horse, where we had more rain turned out better.

Western Rye—This was planted at White Horse, Ten Mile Point and Big Bend, on the Kluahne trail about 80 miles from White Horse. At White Horse and Big Bend, it was a surprise in growth and would yield about three tons, or so, to the acre, while at Ten Mile Point it only attained a growth of three inches.

Hungarian—This was planted at White Horse and was a failure, the season being too dry. Timothy—This was planted by two different parties at White Horse, with one it turned out a failure while with the other, although planted on poorer ground, made a most luxuriant growth and in the opinion of the man who planted it is admirably suited to the conditions existing in this portion of the Yukon Territory.

At Big Bend the timothy was a failure, the man who planted it claiming that it required more water and better preparation of soil than the rye grass.

OATS.

The Improved Ligowo was planted at White Horse and Big Bend, that at White Horse was planted on high and low ground, both ripening and turning out an excellent quality of oats, while that at Big Bend was a failure, the person planting it claiming that the season there was too dry.

Welcome—Some of this seed was planted at Ten Mile Point, put in on new land with no rainfall, it only grew three inches high and was a failure.

WHEAT.

Preston—This was the only variety planted. From one package planted by Mr. J. C. Shermer, Ten Mile Point, he obtained 20 pounds, which grew to a height of 23 inches.

BARLEY.

Champion—This was planted at White Horse and produced an extra good crop, which was of special quality.

Odessa—This seed was planted on very high ground about seven miles from White Horse and grew to a height of thirty inches.

POTATOES.

Rochester Rose—This seed was planted at Ten Mile Point, and 57 pounds raised from a 3-pound package of potatoes. Another 3-pound package of this variety was planted on high land near White Horse, which, however, only produced 12 pounds, but in every other respect were very satisfactory. In the barrack garden at White Horse a 3-pound package of this seed was planted and produced 98½ pounds, nine potatoes weighing 4½ pounds, those potatoes took first prize at the White Horse fair, and it would appear that this variety is particularly suitable for this soil and climate.

Vicks' Extra Early—This variety was planted in White Horse and turned out fairly good.

All the seeds received were distributed amongst ten different parties; seven at White Horse and neighbourhood, one at Ten Mile Point, one at Big Bend on the Kluahne trail, and one at Big Salmon. The party to whom I distributed seeds at Big Salmon, I was unfortunately unable to get any return from, the seeds after being delivered to him having been burnt in the fire which occurred here on the 22nd of May last.

The seeds were distributed between the 12th and 22nd May, and in some instances were not planted until the end of May, which this year was a little late in the season. In conclusion, I might say that of five seasons, this was the most favourable for growing vegetables and grains in this district, and then we did not have any rainfall till the middle of June. It rained two days during June, the 13th and 26th, the total rainfall of the month being ·93 inches.

A. E. SNYDER,
Supt. Commanding 'H' Division.

The success attending these experiments is quite encouraging considering that the seeds arrived so late, and, it was decided to send out another and larger lot of samples similar to those which had done so well in 1905. To save time a part of these



View on the Grounds of the Central Experimental Farm, Ottawa.

Photo by C. L. Sommers.

were forwarded from Brandon, Man., and a second lot from Ottawa. All of these were sent to Dawson addressed to Supt. A. R. Cuthbert.

The samples forwarded from Brandon were sent September 23, and consisted of the following:—

100	lbs.	Preston wheat in	5 lb. bags.
100	"	Stanley wheat in	5 "
100	"	Odessa barley in	2½ "
100	"	Rochester Rose potatoes in	2½ "
100	"	Vick's Extra Early potatoes in	2½ "
50	"	Early Rose potatoes in	2½ "
50	"	Vermont Gold Coin potatoes in	2½ "
25	"	Brome grass in	1 "
25	"	Western Rye grass in	1 "

Subsequently, on October 2, the following were forwarded to the same address, from the Central Experimental Farm, Ottawa:—

100	lbs.	Welcome oats in	2½ lb. bags.
200	"	Improved Ligowo oats in	2½ "
100	"	Odessa barley in	2½ "
200	"	Mensury barley in	2½ "
25	"	Timothy seed in	2½ "
25	"	Hungarian grass in	1 "

A letter was received from Supt. Cuthbert, under date of October 12, acknowledging the receipt of all the samples, which he says arrived in good order.

A further consignment was sent later to White Horse. These samples were sent from the Central Experimental Farm, Ottawa, on November 20, and consisted of the following:—

20	lbs.	Preston wheat in	5 lb. bags.
16	"	Improved Ligowo oats in	4 "
16	"	Odessa barley in	4 "
30	"	Rochester Rose potatoes in	3 "
4	"	Brome grass in	1 "
4	"	Western Rye grass in	1 "
4	"	Timothy in	1 "
4	"	Hungarian grass in	1 "

As these samples have already reached their destination there will be ample time and opportunity for distributing them to the best advantage and so as to admit of their being sown in the coming spring at the earliest opportunity.

Recently samples of two varieties of very early ripening wheats have been forwarded to Dawson. These are new sorts recently introduced by the Cerealist of the experimental farms. One named Aurora, got by selection from an early wheat obtained from a high altitude in the Himalaya mountains in India, the other is an improved and early strain of a cross-bred variety known as Bishop. Aurora is the earliest ripening variety we have yet produced, it ripens more than two weeks earlier than the Red Fife. Bishop is also very early, maturing in about ten days less time than Red Fife. Both are wheats of good quality, but their relative productiveness has not yet been fully ascertained. One pound of the Aurora has been sent in half-pound packages, and two pounds of Bishop also in half-pound packages. The results of these tests will be watched with much interest.

THE INSPECTION AND GRADING OF WHEAT IN THE MANITOBA GRAIN INSPECTION DIVISION.

The methods employed in the inspection of wheat and their fairness to the farmer as well as to the miller or export purchaser have of late attracted some attention. Farmers in some instances have been of opinion that they have not received from the millers the full value, especially of their lower grades of wheat.

This subject has been carefully investigated at the Central Experimental Farm by the Cereal and Chemical Divisions, and a bulletin has been published giving the results of this inquiry. Authentic and representative samples of the different grades of wheat have been obtained from Mr. David Horn, chief inspector of the Manitoba Grain Inspection Division. By the use of a small roller mill flour has been produced from these samples, and the flour made into bread and baked. The results of the bakings several times repeated have been carefully compared as to texture, quality, &c., and the information compiled. In the Chemical Division the samples both of whole wheat and flour have been analysed, and the proportions of their several constituents determined. A comparison of the conclusions reached independently by the Cerealist and Chemist show conclusively that considering the difficulties surrounding this subject, the present system of grading, which is faithfully administered and well carried out works on the whole fairly well. This bulletin has been widely distributed and copies may still be had by any one desiring them by applying to the Director of Experimental Farms.

GRADES OF SPRING WHEAT IN THE MANITOBA GRAIN INSPECTION DIVISION.

The Grain Inspection Act provides that the spring wheat grown in Manitoba and the North-west Territories shall be graded as follows:—

Extra Manitoba hard wheat shall weigh not less than 62 pounds per bushel, shall be plump, sound and well cleaned and shall contain not less than eighty-five per cent of hard red Fife wheat.

No. 1 Manitoba hard wheat shall be plump, sound and well cleaned, weighing not less than 60 lbs. to the bushel, and shall be composed of at least seventy-five per cent of hard red Fife wheat.

No. 1 hard white Fife wheat shall be sound and well cleaned, weighing not less than 60 lbs. to the bushel and shall be composed of not less than sixty per cent of hard white Fife wheat, and shall not contain more than twenty-five per cent of soft wheat.

No. 1 Manitoba northern wheat shall be sound and well cleaned, weighing not less than 60 lbs. to the bushel and shall be composed of at least sixty per cent of hard red Fife wheat.

No. 2 Manitoba northern wheat shall be sound and reasonably clean, of good milling qualities and fit for warehousing, weighing not less than 58 pounds to the bushel, and shall be composed of at least forty-five per cent of hard red Fife wheat.

Any wheat not good enough to be graded No. 2 Manitoba northern shall be graded No. 3 Manitoba northern, in the discretion of the inspector.

These grades form the bulk of the wheat marketed every season. In a good year the larger part of the grain will be No. 1 Hard and No. 1 Northern, while in a poor year the proportions of No. 2 and No. 3 Northern will be larger.

Every year a considerable number of cars containing wheat of too low a quality to be graded as No. 3 Northern, find their way into the market, and special standards are prepared for these low class products, such as No. 4 Extra, No. 4, No. 5, Feed and No. 2 Feed. Any good wheat that is damp and which cannot be safely warehoused, is classed as No Grade. All good wheat that contains a large admixture of other kinds of grain is also classed as No Grade. All grain brought to the market in a heating condition or mixed with heated grain, is entered on the inspector's books as condemned.

Portions of the crop of 1904 were damaged by rust. Some of this when threshed was of so little value and weight that it compared only with elevator cleanings; such grain is graded as 'screenings.'

Any wheat that is injured by smut is classed as 'No. 1 rejected.' If very smutty, as 'No. 2 rejected.'

Where wheat contains a large proportion of weed seeds such as wild oats, the seeds of rag-weed, &c., it is classed as 'rejected,' without using any number.

Such low grades of wheat as cannot be used profitably for flour are ground and sold as feed for stock. Wheat rejected on account of smut or weeds is usually sent to Fort William to an elevator provided with special cleaning apparatus, and after it is cleaned and dried it may be given a grade, and can then be marketed in the usual way.

VISIT TO THE INSPECTOR'S OFFICE AND RAILWAY YARDS.

Being desirous of seeing the actual working of the methods adopted for the inspection and grading of wheat, I called on Mr. David Horn, Chief Inspector at Winnipeg, on the morning of September 23, 1905, who showed me much courtesy. I was first taken through his own office where the work of inspection and grading was in progress. Then provided with a note to one of his deputies, I visited the railway yard where some 200 cars of wheat which had just arrived were being inspected and graded.

As the train comes into the yard the conductor goes to the railway office with his bills to report his train. The inspector makes a list of the grain cars on these bills from which he learns where each car is from, where it is going, the name of the shipper and of the party to whom it is consigned. With this information he goes with his men at once to the train. The inspector has usually three men with him.

One man opens the doors of each car and closes them again after the inspection is over. When the doors are opened the other two men enter the car. A car laden with wheat is usually filled to a depth of about 5 feet. This leaves room between the wheat and the roof of the car for these men to work. One man carries with him a cotton sheet about a yard long and three-quarters of a yard wide, which he spreads on top of the wheat. The other carries what is known as a 'stabber,' a cylindrical brass instrument, reminding one of a large syringe. This is about 6 feet long and 2½ inches in diameter and pointed at the lower end. The instrument is hollow and consists of an interior and exterior tube which by a turn of the handle at the end can be made to slide one on the other. Each tube has openings at intervals, about 5 inches long and an inch wide which are alike in each tube. By turning the outer tube these openings are closed. The stabber is then thrust through the grain in a somewhat slanting direction until the pointed end reaches the floor, then, with a turn of the handle the openings in the tube are brought opposite each other, when the grain immediately flows into and fills the instrument. By reversing the handle the holes are closed so that the grain cannot fall out, and when the 'stabber' is brought up it brings with it a complete section of the wheat which that part of the car contains. The grain is let out of the instrument at the top and placed on the sheet in the form of an irregular band from 4 to 6 inches wide, 2½ feet long, and about half an inch deep, showing the character of the wheat from the top to the bottom of the car. This is done from seven to ten or twelve times in different parts of the car, and spread each time on the sheet as described. When the car has been 'stabbed' a sufficient number of times and the grain properly spread on the sheet, the inspector has before him a complete display of the character and quality of the contents of the car from the bottom to the top. He then examines this and writes on a card the number of the car, the date of inspection, and his opinion of the grade. He also puts about two pounds of the mixed grain on the sheet into a cotton bag which closes by a draw-string, the card is placed inside the bag and the bag hung on a point of the car outside, to be taken from thence to the inspector's office.

Occasionally a car is found to be 'plugged,' that is fraudulently loaded by putting inferior wheat in parts of the car where the shipper imagines it will not be detected. Where any indication of this is noticed the car is 'stabbed' in many places, and all parts of it closely examined. If the inspector has reason to believe that plugging was intended the law requires that the whole car shall be graded at the same value as the poorest grade found in the car. This penalty is a severe one, and hence 'plugging' is not a common practice.

With sufficient and competent help the grading of grain is very rapidly done, and a whole train load of wheat can be examined and graded in the course of an hour or two. The sample bags from the cars are carried to the inspector's office near the railway yard, where they are successively spread out on a large table, carefully examined, and their grade finally determined by the deputy inspectors. The grain is then put back in the bags with the cards, when they are filed away for reference.

A complete report on each car is made, one copy of which is sent to Fort William and another to the office of the chief inspector, Mr. David Horn. Certificates for each car are also sent to the parties interested. Every day the entire record for all the cars arriving during the previous 24 hours is completed and disposed of. From 20 to 30 men are employed at this work during the busy period. The fee fixed by law for the inspection is 40 cents per car; the cars will average about 1,000 bushels each.

HOW FARMERS DISPOSE OF THEIR CROPS.

Some farmers sell their grain at the elevators, while others prefer to load and ship their own grain. These latter usually consign their wheat to an independent broker, one not connected in any way with elevator or railway companies. He charges one cent per bushel for looking after the business of marketing the wheat, and remitting the money received for it. If the farmer sells to an elevator company, his wheat is then graded by the man in charge, but only temporarily and for the purpose of giving the farmer cash. If the farmer objects to the local grading a sample of the wheat is sent to the chief inspector at Winnipeg, and if he grades it higher than the man at the elevator did, then the elevator company must pay the farmer the difference in market price between the grades on the day of sale.

HOW THE CROPS OF 1904 AND 1905 HAVE GRADED.

In the following table the first column shows the total returns for the inspection of the crop of 1904. In the second column the total number of cars of wheat of the crop of 1905, inspected to December 1, 1905:—

Crop of 1904.	Cars.	*Crop of 1905 Inspected to Dec. 1, 1905.*	Cars.
No. 1 Hard	176	No. 1 Hard	532
No. 1 Northern	3,788	No. 1 Northern	17,833
No. 2 "	11,585	No. 2 "	6,858
No. 3 "	9,293	No. 3 "	996
No. 4 Extra	2,214	No. 4 Extra	5
No. 4	3,036	No. 4	58
No. 5	2,247	No. 5	1
Feed	1,098	Feed	None.
Feed No. 2	233	Feed No. 2	None.
Rejected (for weed seeds)	603	Rejected (for weed seeds)	1,535
No. 1 Rejected (for smut)	631	No. 1 Rejected (for smut)	1,227
No. 2 " "	591	No. 2 " "	1,234
Screenings	40	Screenings	9
Condemned	78	Condemned	10
No Grade	2,279	No Grade	155

INCREASE IN PROPORTION OF WEEDY AND SMUTTY WHEAT.

A study of these figures shows that the character of the season is a most important factor in determining the value of the wheat crop. The year 1904 was comparatively unfavourable, while the present year has been favourable. That portion of the crop (probably about two-thirds of the whole) marketed before December 1, 1905, is largely No. 1 Northern. It is also worthy of comment that the number of cars of wheat graded rejected this year on account of weed seeds is more than double that of 1904. The total number classed as 'rejected' for smut has also more than doubled. While the bulk of this wheat classed as rejected is ultimately recovered, the cost and loss of weight entailed by the scouring and cleansing required to bring the sample into a marketable condition are very considerable and materially lessen the returns received by those farmers who send their wheat to market in a condition so dirty and discreditable as to justify the inspectors in marking it 'rejected.' A more vigorous campaign is evidently needed against weeds and smut, to stir up these careless farmers now to a sense of their duty.

HOW THE UNIFORMITY OF THE GRADES IS MAINTAINED.

Objection has sometimes been made to the method of grading wheat on the ground that the grades are lacking in uniformity from year to year. Prior to 1899 the grades were fixed from season to season by a board of experts, on samples of the current year's growth brought from different localities and compared. Under that arrangement it is quite likely that the grades varied more or less from year to year. Under the present system a handful is taken from each carload, graded and thrown into a vessel or bin provided for that grade, and this grain thus mixed is used as a basis for the same grade the following season. Samples are given to the inspectors and others requiring them, and in this way the grades are maintained of a uniform character.

The system of grading as carried on by the Manitoba Grain Inspection Division, under direction of the Chief Inspector, Mr. David Horn, seems to be very thorough and satisfactory and to command the confidence both of the farmers and buyers in a marked degree.

CO-OPERATIVE EXPERIMENTS BY CANADIAN FARMERS.

The assistance rendered to Canadian farmers by the distribution of samples of seed of high quality for the improvement of crops has been continued with gratifying results. Farmers everywhere have gladly undertaken to co-operate with the experimental farms in the endeavour to ascertain the relative merits in earliness, productiveness and quality of the different sorts under trial when grown under the different climatic conditions which prevail in the several provinces of the Dominion.

During the present year 41,548 farmers have joined in these co-operative tests. A large number of reports have been received expressing appreciation of the great value of this work. The samples of wheat and barley sent out have weighed five pounds each, and those of oats four pounds, sufficient in each case to sow one-twentieth of an acre. The samples of Indian corn, pease and potatoes have weighed three pounds each.

The samples sent from the Central Experimental Farm during the distribution period for the past year have been distributed as follows:—

DISTRIBUTION BY PROVINCES.

Name of Grain.	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	North-west Territories.	British Columbia.
Oats	836	1,513	1,664	4,735	1,713	551	1,517	86
Barley	114	433	217	1,473	650	176	579	41
Wheat	250	718	836	2,874	757	1,496	2,499	64
Pease	10	102	131	406	102	39	79	7
Indian Corn	26	148	116	511	450	78	117	33
Potatoes	157	859	1,053	2,075	2,356	905	1,958	436
Total	1,393	3,773	4,017	12,074	6,028	3,245	6,749	667

Total number of samples distributed, 37,946.
Number of applicants supplied, 37,865.

Total number of packages of each sort distributed :—

Oats	12,615
Barley	3,683
Wheat	9,494
Pease	876
Indian Corn	1,479
Potatoes	9,799
Total	37,946

The following list shows the number of packages which have been sent of the different varieties :—

Name of Variety.	Number of Packages.
OATS.	
Banner	3,027
Improved Ligowo	1,633
Waverley	1,514
Wide Awake	1,503
Thousand Dollar	1,448
Abundance	1,354
Tartar King	1,083
Goldfinder	749
Black Beauty	299
Total	12,615
BARLEY (Six-rowed).	
Mensury	928
Odessa	611
Claude	605
Mansfield	465
(Two-rowed.)	
Invincible	369
Standwell	282
Sidney	252
Canadian Thorpe	171
Total	3,683

Name of Variety.	Number of Packages.
SPRING WHEAT.	
Laurel	1,950
Preston	1,694
Red Fife	1,262
Stanley	1,029
Wellman's Fife	961
White Fife	836
Percy	804
Huron	591
Monarch	271
White Russian	46
Common Emmer	32
Early Riga	18
Total	9,494
PEASE.	
Arthur	585
White Wonder	291
Total	876

Name of Variety	Number of Packages.
INDIAN CORN.	
Compton's Early	477
Longfellow	376
Early Mastodon	335
Selected Leaming	140
Angel of Midnight	112
Sanford	39
Total	1,479

Name of Variety.	Number of Packages
POTATOES.	
Early White Prize	1.515
Carman No. 1	1,206
Uncle Sam	1,084
American Wonder	1,071
Canadian Beauty	822
Rochester Rose	742
Dr. Maerker	581
Early Andes	499
Burnaby Mammoth	452
Bovee	431
Country Gentleman	420
Money Maker	340
Everett	285
Swiss Snow Flake	196
Late Puritan	139
Dreer's Standard	16
Total	9,799

DISTRIBUTION OF SAMPLES FROM THE BRANCH EXPERIMENTAL FARMS.

Samples were also distributed from the Branch Experimental Farms, as follows:—

Experimental Farm, Nappan, N.S.	No. of Sample Bags.
Spring wheat	69
Oats	167
Barley	89
Pease	41
Potatoes	280
Buckwheat	23
Total	669

Experimental Farm, Brandon, Man.	No. of Sample Bags.
Spring wheat	131
Oats	100
Barley	40
Pease	72
Potatoes	206
Total	549

Experimental Farm, Indian Head, Sask.	
Spring wheat	546
Oats	406
Barley	197
Pease	87
Flax, Rye and Spelt	25
Potatoes	618
Total	1,879

Experimental Farm, Agassiz, B.C.	
Spring wheat	56
Oats	173
Barley	74
Pease	161
Potatoes	203
Total	667

By adding the number of farmers supplied by the Branch Farms to those supplied by the Central Farm we have a total of 41,548. It is gratifying to find among the farmers of Canada so large a number of volunteers in this co-operative work. The average number of samples distributed each year for the past ten years has been 37,521.

In growing and preparing this large quantity of seed grain for distribution great care is taken to have it clean and true to name. Most of it is grown on the Experimental Farms at Indian Head and Brandon, where the crops average larger yields and a heavier weight per bushel than they do at Ottawa.

To provide the large quantity of seed required for this work arrangements are made for growing the varieties needed the previous year. While maturing in the fields most of the grain is carefully examined and any plants found of other varieties are pulled up. After the grain is threshed it is passed through suitable cleaning machinery and then thoroughly examined, and if there are any foreign seeds present which the cleaners will not remove the grain is hand-picked before it is sent out. These samples are sent free of charge to the nearest post office. They are sent only in response to personal application, and only one variety is obtainable by one applicant each year. Those farmers who take good care of the sample received usually have at the end of

the second year sufficient seed for a considerable area, and after that have all they require for their own use, and some surplus to sell to their neighbours.

It is remarkable how rapidly a supply of grain may be built up from a single four or five-pound sample. Take for instance, a sample of oats. The four pounds received will, if well cared for, usually produce from three to four bushels. This sown on two acres of land will at a very moderate estimate give one hundred bushels, and some times much more, but taking the lower figure as the basis for this calculation, the crop at the end of the second year would be sufficient to sow fifty acres, which at the same moderate computation would furnish 2,500 bushels, available for seed or sale at the end of the third year.

The critical point in these tests is the threshing of the grain at the end of the first season, and it is here that some farmers fail to get the full advantage of the experiment. The product of the one-twentieth acre plot is sometimes threshed in a large machine, which it is difficult to thoroughly clean, and in this way the grain becomes mixed with other varieties and practically ruined. At the Central Experimental Farm we thresh the produce of many of the small plots of grain by cutting off the heads, placing them in sacks and beating them with a stick, and winnowing until most of the chaff is got rid of, and the grain made clean enough for sowing.

Where the farmer is to use this seed for his own sowing it is not necessary that the sample be entirely free from chaff. It is, however, most essential if he is to get the full benefit of his experiment, that the grain be quite free from all admixture with other sorts. Farmers are expected to harvest the product of their experimental plot separately, and store it away carefully, threshing it by hand either with a flail or in such other manner as they may prefer. The results to be gained will abundantly repay the careful handling of the grain in this way.

Occasional complaints are made that the samples are too small and that not less than two bushels of grain should be sent to each applicant. If such quantities were sent the distribution must necessarily be limited to comparatively few individuals, which would be very unfair. The experimental farm officers have also been criticised for not arranging to sell any surplus seed grain to farmers in quantities of two bushels and upwards. As a matter of fact this has been the practice at the western farms for many years past. Every season after the regular distribution of smaller samples has been provided for the surplus grain not needed for seed has been sold to farmers in quantities of two to ten bushels or more each.

At the Indian Head Experimental Farm the following number of farmers have been supplied in this way:

In 1904—
24 farmers purchased from 2 to 5 bushels each of seed wheat.
7 two to five bushels of seed oats.
9 two to five bushels of seed barley.

40 in all.

In 1905—
107 farmers bought from 2 to 10 bushels each of seed wheat.
74 two to ten bushels or more of seed oats, and
24 bought 2 to 10 bushels or more of seed barley.

205 in all.

At the Brandon experimental farm in 1904—
10 farmers bought from 2 to 10 bushels each of seed wheat.
112 two to ten bushels or more of seed oats, and
21 from 2 to 10 bushels, or more of seed barley.

143 in all.

In 1905—
32 farmers bought from 1 to 5 bushels each of seed wheat.
6 from 2 to ten bushels, or more of seed oats, and
30 from 2 to ten bushels, or more of seed barley.

68 in all.

It will thus be seen that within the past two years 245 farmers have been supplied with these larger lots from the experimental farm at Indian Head and 211 from the experimental farm at Brandon, a total of 456. The following note from one of those who bought seed wheat at Brandon will serve as an example of the way these larger lots are appreciated:—

GLADSTONE, MAN., December 29, 1905.

S. A. BEDFORD, ESQ.,

DEAR SIR,—Just a few lines in report on the four bushels of Red Fife wheat that James Huddleston and myself received from you last spring. We sowed it on April 24 and harvested it on August 26. There was about three acres and the total yield was 133 bushels, about 45 bushels per acre, which was about twice the yield of the rest of our crop. I must say we are well satisfied and would recommend any farmer to get a few bushels of wheat from you when possible.

Yours respectfully,

A. M. HUDDLESTON.

CORRESPONDENCE.

The correspondence carried on during 1905 between the farmers of Canada and the officers of the Experimental Farms has been very large.

CENTRAL EXPERIMENTAL FARM.

The following is a summary of the letters received and sent out at the Central Experimental Farm from December 1, 1904 to November 30, 1905; also the number of reports, bulletins and circulars forwarded by mail during the same period:—

	Letters received.	Letters sent.
Director	51,908	19,074
Agriculturist	2,090	3,206
Horticulturist	1,634	1,626
Chemist	1,531	1,441
Entomologist and Botanist	3,406	3,291
Cerealist	289	208
Poultry Manager	2,993	3,043
Accountant	988	1,401
Totals	64,839	33,290

A large number of the letters received by the Director are applications for samples of grain, or for the publications of the farms, a considerable proportion of which are answered by sending the correspondents the material asked for, accompanied by circular letters. This explains why the number of letters received so much exceeds the number sent out.

Circular letters, including circulars sent with samples of seed grain	39,105
Reports and bulletins mailed	351,374
Total	390,479

BRANCH EXPERIMENTAL FARMS.

The correspondence with the Superintendents of the branch experimental farms is shown by the following figures:—

	Letters received.	Letters sent.
Experimental Farm, Nappan, N.S.	2,080	1,812
" Brandon, Man.	4,783	3,140
" Indian Head, Sask.	7,820	7,874
" Agassiz, B. C.	3,187	2,953
Totals	17,870	15,779

Much additional information has also been sent out from the branch farms in printed circulars. By adding the correspondance conducted at the branch farms to that of the central farm, it will be seen that 82,709 letters in all were received, and 49,069 sent out during the year..

TESTS OF THE VITALITY OF SEED GRAIN AND OTHER SEEDS.

The number of samples of seeds tested during the season of 1904-05 to find the proportion which would germinate and to determine the percentage of plants of strong and weak growth, was 1,949.

This useful work has been carried on at the Central Experimental Farm every year since its establishment in 1887, and the total number of samples tested from that time to the present is 33,685. By instruction of the Hon. Minister of Agriculture this work will in future be done by the seed division, hence any farmer or seedsman desiring to have samples tested should address them to the Seed Commissioner, Department of Agriculture, Ottawa.

RESULTS OF TESTS OF SEEDS FOR VITALITY 1904-05.

Kind of Seed.	Number of Tests.	Highest Percentage.	Lowest Percentage.	Percentage of Strong Growth.	Percentage of Weak Growth	Average Vitality.
Wheat	660	100·0	0·0	81·1	4·8	85·9
Barley	328	100·0	3·0	85·5	6·2	91·8
Oats	498	100·0	2·0	78·6	6·3	84·9
Rye	7	94·0	80·0	81·8	4·1	86·0
Pease	136	100·0	2·0			73·4
Grass	63	98·0	1·0			74·1
Clover	112	97·0	26·0			78·8
Flax	17	78·0	56·0			67·4
Corn	34	100·0	26·0			74·0
Tares	2	92·0	15·0			53·5
Carrots	10	88·0	0·0			30·9
Onions	8	83·0	2·0			59·7
Cabbage	9	88·0	1·0			59·4
Radish	11	79·0	19·0			44·6
Squash	7	22·0	0·0			4·2
Musk melon	8	72·0	4·0			37·5
Water melon	2	56·0	44·0			50·0
Lettuce	4	86·0	10·0			31·5
Parsnip	4	70·0	40·0			60·2
Beet	4	76·0	32·0			54·0
Tomato	3	63·0	4·0			36·6
Celery	3	39·0	0.0			13·6
Tobacco	6	51·0	10·0			34·8
Turnips	2	100·0	86·0			93·0
Cress	2	87·0	7·0			47·0
Spinach	2	12·0	0·0			6·0
Miscellaneous seed	7	79·0	0·0			36·1
Total number of samples tested, highest and lowest percentage	1,949	100·0	0·0			

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TABLE SHOWING RESULTS OF GRAIN TESTS FOR EACH PROVINCE.

Ontario.

Kind of Seed.	Number of Tests.	Highest Per-centage.	Lowest Per-centage.	Per-centage of Strong Growth.	Per-centage of Weak Growth.	Average Vitality.
Wheat	228	100·0	0·0	69·5	7·1	76·7
Barley	122	100·0	3·0	79·8	8·8	88·7
Oats	121	100·0	2·0	82·4	8·2	90·6

Quebec.

Wheat	33	99·0	63·0	87·1	3.1	90·3
Barley	15	99·0	33·0	84·4	5·0	89·4
Oats	21	100·0	86·0	91.4	2·9	94·4

Manitoba.

Wheat	149	100·0	36·0	87·3	4·2	91·6
Barley	54	100·0	65·0	90·0	4·0	91·0
Oats	114	100·0	16·0	74·5	7·2	81·7

North-west Territories.

Wheat	118	100·0	39·0	83·8	4·1	87·9
Barley	68	100·0	13·0	86·9	4·1	91·1
Oats	160	99·0	4·0	70.5	6·4	76·9

Nova Scotia.

Wheat	56	100·0	82·0	90·7	3·0	93·8
Barley	47	100·0	78·0	91·9	6·1	98·0
Oats	47	100·0	20·0	93·4	1·9	95·3

New Brunswick.

Wheat	32	100·0	59·0	92·8	1·7	94·5
Barley	8	100·0	38·0	81·2	6·0	87·2
Oats	14	100·0	76·0	90·5	3·6	94·1

Prince Edward Island.

Wheat	15	100 0	74·0	95·2	1·1	96·3
Barley	13	100·0	80·0	93·6	3·2	96·9
Oats	15	100·0	79·0	92·0	3·8	95·9

British Columbia.

Wheat	29	100·0	50·0	83·4	2·9	86·4
Barley	1	100·0	100·0	98·0	2·0	100·0
Oats	6	94·0	57·0	73·8	7.8	81·6

Signed, WILLIAM T. ELLIS.

Meteorological Observations.

Table of Meteorological Observations taken at the Central Experimental Farm, Ottawa, 1905; maximum, minimum, and mean temperature for each month, with date of occurrence, also rainfall, snowfall, and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of days Precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°							
January...	16·92	—3·69	20·62	6·62	39·3	1st	—20·0	14th	T	34·00	3·39	15	1·40	7th
February..	18·38	—2·16	20·54	8·11	32·0	10th & 20th	—18·7	16th	.....	23·00	2·30	15	0·45	6th
March.....	33·05	11·45	21·59	22·21	50·0	30th	—16·0	14th	0·81	4·00	1·21	10	0·42	19th
April..	52·54	29·74	22·80	41·14	75·0	28th	20·7	2nd	0·89	1·00	0·99	10	0·29	29th
May.....	65·82	42·47	23·34	54·14	78·8	25th	29·5	1st & 2nd	1·90	.....	1·90	13	0·39	15th
June.....	75·80	52·80	23·00	64·30	86·5	20th	39·0	1st & 8th	4·63	.....	4·63	11	1·94	13th
July.	79·67	58·62	21·04	69·14	91·4	18th	48·0	21st	4·76	.....	4·76	19	1·13	30th
August....	77·02	53·73	23·28	65·37	86·6	10th	45·2	14th	4·07	.....	4·07	15	0·87	12th
September.	69·45	48·00	21·44	58·72	80·2	10th	32·2	26th	2·83	.....	2·83	14	0·98	18th
October....	55·65	35·08	20·57	45·36	76·0	1st	16·5	30th	2·43	0·50	2·48	14	0·75	11th
November..	38·17	22·86	15·31	30·51	53·2	25th	3·2	30th	0·56	8·25	1·38	14	0·40	8th
December..	28·60	11·57	17·02	20·08	41·5	8th	—13·1	16th	0·83	16·50	2·48	20	0·78	29th
	.....	....	...	.. ..	....	....	.....	.. ....	23·71	87·25	32·42	170	....	....

Rain or snow fell on 170 days during the 12 months.

Heaviest rainfall in 24 hours, 1.94 inches on June 13th.

Heaviest snowfall in 24 hours, 14·00 inches on January 7th.

The highest temperature during the 12 months was 91·°4 on July 18th.

The lowest temperature during the 12 months was 20·°0 on January 14th.

During the growing season rain fell on 10 days in April, 13 days in May, 11 days in June, 19 days in July, 15 days in August, and 14 days in September.

March and April show the lowest number of days with precipitation, viz., on 10 days during each month.

Total precipitation during the 12 months, 32·42 inches, as compared with 36·79 inches during 1904.

Rainfall, Snowfall and Total Precipitation from 1890 to 1905; also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35·97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·27
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1903	26·43	85·00	34·92
1904	25·95	108·75	36·79
1905	23·71	87·25	32·42
Total for 16 years	425·59	1,441·10	569·63
Yearly average for 16 years	26·56	90·06	35·60

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RECORD of Sunshine at the Central Experimental Farm, Ottawa, for the year 1905.

MONTHS.	1905.			
	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
January	23	8	79·6	2·56
February	21	7	120·8	4·31
March	29	2	169·1	5·45
April	26	4	175·8	5·86
May	29	2	219·6	7·08
June	28	2	195·2	6·50
July	28	3	205·0	6·61
August	30	1	260·5	8·40
September	27	3	155·9	5·19
October	27	4	153·8	4·96
November	21	9	89·4	2·98
December	20	11	68·8	2 21

(Signed,)

WILLIAM T. ELLIS,
Observer.

SPECIAL EXPERIMENTS WITH FERTILIZERS.

In the Annual Report of the Experimental Farms for 1893, details were given on pages 8 to 24 of the results of a series of tests which had then been carried on for some years with the object of gaining information regarding the effects which follow the application of certain fertilizers and combinations of fertilizers on the more important farm crops.

These experiments have been continued, and a summary of the results obtained has been given each year, taking the average yield of crops from the beginning, adding the results for the current year, and then giving the average yield for the full time. These tests were undertaken on virgin soil, on a piece of land which was cleared for the purpose. For particulars regarding the clearing and preparing of the land for crop in 1887-88 and its subsequent treatment, the reader is referred to the earlier issues of this report.

VALUABLE INFORMATION GAINED.

From this long conducted series of tests some useful information has been gained. These trials have shown that barn-yard manure can be most economically used in the fresh or unrotted condition; that fresh manure is equal, ton for ton, in crop-producing power to rotted manure, which, other experiments have shown, loses during the process of rotting about 60 per cent of its weight. In view of the vast importance of making the best possible use of barn-yard manure, it is difficult to estimate the value of this one item of information.

When these experiments were planned, the opinion was very generally held that untreated mineral phosphate, if very finely ground, was a valuable fertilizer, which gradually gave up its phosphoric acid for the promotion of plant growth. Ten years' experience has shown that mineral phosphate, untreated, is of no value as a fertilizer.

The use of sulphate of iron, which at the time these tests were begun, was highly recommended, as a means of producing increased crops, has also been proven to be of very little value for this purpose.

Common salt, which has long had a reputation with many farmers for its value as a fertilizer for barley, while others disbelieved in its efficacy, has been shown to be a valuable agent for producing an increased crop of that grain, while it is of much less use when applied to crops of spring wheat or oats. Land plaster or gypsum has also proven to be of some value as a fertilizer for barley, while of very little service for wheat or oats. Some light has also been thrown on the relative usefulness of single and combined fertilizers.

CHANGES MADE IN THE EXPERIMENTS.

After ten years' experience had demonstrated that finely-ground, untreated mineral phosphate was of no value as a fertilizer, its use was discontinued in 1898. Prior to this it had been used in each set of plots in Nos. 4, 5, 6, 7 and 8, in all the different series of plots, excepting roots. In 1898 and 1899, similar weights of the Thomas' phosphate were used in place of the mineral phosphate, excepting in plot 6 in each series. In this plot the Thomas' phosphate was used in 1898 only.

After constant cropping for ten or eleven years, it was found that the soil on those plots to which no barn-yard manure had been applied was much depleted of humus, and hence its power of holding moisture had been lessened, and the conditions for plant growth, apart from the question of plant food, had on this account become less favourable. In 1899 the experiments were modified and an effort made to restore some proportion of the humus and at the same time gain further information as to the value of clover as a collector of plant food. In the spring of that year ten pounds of red clover seed per acre was sown with the grain on all the plots of wheat, barley and oats. The young clover plants made rapid growth, and by the middle of October there was a thick mat of foliage varying in height and density on the different plots, which was ploughed under. No barn-yard manure was applied on plots 1 and 2 in each series since 1898.

In 1900 all the fertilizers on all the plots were discontinued, and since then to 1905 the same crops have been grown on all these plots from year to year without fertilizers, sowing clover with the grain each season. In this way some information has been gained as to the value of clover as a collector of plant food, and also as to the unexhausted values of the different fertilizers which have been used on these plots since the experiments were begun. In 1905 all the fertilizers were again used as at the beginning.

SPECIAL TREATMENT OF PLOTS OF INDIAN CORN AND ROOTS.

As it was not practicable to sow clover with the Indian corn and root crops, the sowing of these latter crops was discontinued in the spring of 1900 and clover sown in their place in the proportion of 12 pounds per acre. The clover on these plots made strong growth, so strong as to necessitate twice cutting during the season, the cut clover being left on the ground in each case to decay and add to the fertility of the soil. The clover was left over for further growth in the spring of 1901, and ploughed under for the roots about May 10, and for corn about the middle of that month. Then roots and Indian corn were again sown. In 1902 crops of Indian corn and roots were grown on these plots, in 1903 the land was again devoted to clover and was in Indian corn and roots again in 1904 and in 1905.

WHEAT PLOTS.

The seed sown on each of these plots from the beginning has been in the proportion of 1½ bushels per acre, excepting in 1894; and the varieties used were as follows:—In 1888 to 1891, White Russian, and in 1892-3, Campbell's White Chaff. In 1894, Rio Grande was used, and from 1895 to 1905, inclusive, Red Fife. In 1905 the Red Fife was sown May 4, and was ripe August 12.

TABLE I.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as at first, clover discontinued.	Average Yield for Seventeen Years.		18th Season 1905. Variety Red Fife.		Average Yield for Eighteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted 12 tons per acre in 1888; 15 tons per acre each year after to 1898 inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre again used.....	22 $37\frac{16}{17}$	3947	20 50	3610	22 $31\frac{17}{18}$	3928
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre in 1888: 15 tons per acre each year after to 1898 inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre again used.	22 $50\frac{8}{17}$	3985	21 30	3690	22 46	3969
3	Unmanured from the beginning.....	11 $42\frac{16}{17}$	1937	13 10	1460	11 $47\frac{14}{18}$	1910
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 Thomas' phosphate again used as in 1899....	12 $23\frac{14}{17}$	2056	16 40	1680	12 $38\frac{1}{18}$	2035
5	Mineral phosphate, untreated, finely ground, 500 lbs., nitrate of soda, 200 lbs., per acre used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.	13 $19\frac{13}{17}$	2680	16 10	2190	13 $29\frac{3}{18}$	2653
6	Barn-yard manure, partly rotted and actively fermenting, six tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898, 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898.....	19 $28\frac{13}{17}$	3270	17 ..	3450	19 $20\frac{9}{18}$	3280
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	13 $52\frac{7}{17}$	2590	15 50	3160	13 $58\frac{17}{18}$	2622
8	Mineral phosphate, untreated, finely ground, 590 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	11 50	2226	15 30	2330	12 $2\frac{4}{18}$	2232

TABLE I.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF WHEAT—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898, clover discontinued.	Average Yield for Seventeen Years.		18th Season, 1905. Variety, Red Fife.		Average Yield for Eighteen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	12 $33\frac{3}{17}$	2002	14 40	2110	12 $40\frac{3}{18}$	2008
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	13 28	2935	15 10	2810	13 $33\frac{12}{18}$	2930
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	14 $23\frac{14}{17}$	2863	13 40	2780	14 $21\frac{7}{18}$	2858
12	Unmanured from the beginning	10 $41\frac{3}{17}$	1911	10 40	1240	10 $41\frac{2}{18}$	1874
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 bone again used as at first	12 $47\frac{14}{17}$	2083	14 10	2490	12 $52\frac{7}{18}$	2106
14	Bone, finely ground, 500 lbs.; wood ashes unleached, 1,500 lbs. per acre; used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first	15 $32\frac{6}{17}$	2632	15 40	3100	15 $32\frac{14}{18}$	2658
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1995. In 1905 fertilizer again used as at first	14 $21\frac{3}{17}$	2472	15 10	2570	14 $23\frac{16}{18}$	2477
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	15 $39\frac{10}{17}$	2282	13 40	2820	15 $32\frac{17}{18}$	2312
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	13 $3\frac{16}{17}$	2475	13 10	2450	13 $4\frac{5}{18}$	2474
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	12 $53\frac{4}{17}$	2020	13	2100	12 $53\frac{11}{18}$	2024
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	13 $54\frac{1}{17}$	1655	13 30	2030	13 $52\frac{13}{18}$	1676
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	12 $53\frac{12}{17}$	1966	13 50	1830	12 $56\frac{15}{18}$	1958
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	13 $13\frac{8}{17}$	1960	14 10	1850	13 $16\frac{6}{18}$	1954



PRESTON WHEAT IN STOOK, EXPERIMENTAL FARM, INDIAN HEAD, SASK. CROP, 469 BUSHELS FROM 10 ACRES. *Photo. by C. E. Saunders.*

BARLEY PLOTS.

The quantity of seed sown per acre on the barley plots was 2 bushels in 1889 to 1891, 1½ bushels in 1892 and 1893, and 2 bushels from 1894 to 1905 inclusive. Two-rowed barley was used for seed throughout until 1902, when Mensury, a six-rowed sort, was tried. The varieties used were as follows: 1889 to 1891, Saale; 1892, Goldthorpe; 1893, Duck-bill; and in 1894 to 1901, Canadian Thorpe, a selected form of the Duck-bill. Since 1902 Mensury has been sown. In 1905 it was sown May 4, and was harvested on July 30.

TABLE II.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Sixteen Years.		17th Season, 1905. Variety, Mensury.		Average Yield for Seventeen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre again used.....	35 45 12/16	3047	56 2	2960	37 5 15/17	3042
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre again used.....	35 32 2/16	3198	59 38	3010	37 4 4/17	3187
3	Unmanured from the beginning.....	14 35 11/16	1530	22 34	1790	15 10 3/17	1545
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	16 2 8/16	1519	31 22	2870	16 46	1593
5	Mineral phosphate, untreated, finely ground 500 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	21 13 6/16	2193	37 4	3070	22 10	2245
6	Barn-yard manure, partly rotted and actively fermentlng, 6 tons per acre: mineral phosphate, untreated, finely ground, 500 lbs. per acre composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1893.....	29 3 12/16	2416	54 8	3220	30 26 16/17	2463
7	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs, of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	26 39 11/16	2401	47 34	3170	28 2 11/17	2446

TABLE II.—EXPERIMENTS WITH FERTILIZERS ON PLOTS OF BARLEY—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898 clover discontinued.	Average Yield for Sixteen Years.		17th Season, 1905. Variety, Mensury.			Average Yield for Seventeen Years.		
		Yield of Grain.	Yield of Straw.	Yield of Grain.		Yield of Straw.	Yield of Grain.		Yield of Straw.
		Per acre.	Per acre	Per acre.		Per acre	Per acre.		Per acre
		Bush. lbs.	Lbs.	Bush. lbs.		Lbs.	Bush. lbs.		Lbs.
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	22	30 9/16	1850	40	..	2720	23	31 10/17 1901
9	Mineral superphosphate No. 1, 500 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizer used 1900 to 1905. In 1905 fertilizer again used as in 1899	22	0 9/16	1701	38	26	3040	22	47 4/17 1780
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	27	45 4/16	2322	43	36	3350	28	41 15/17 2382
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899	27	17 2/16	2462	45	39	3180	28	20 12/17 2504
12	Unmanured from the beginning	14	22 1/16	1240	24	28	1880	15	2 11/17 1278
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 bone again used as at first	15	33 7/16	1430	35	20	1530	16	41 2/17 1436
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first	24	12 8/16	2123	45	40	2690	25	25 5/17 2151
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	21	46 11/16	2224	28	6	2000	22	16 1/17 2211
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	22	43 11/16	1832	31	2	2090	23	18 11/17 1847
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	19	17 13/16	1903	32	44	1930	20	8 1/17 1905
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	18	47 14/16	1633	34	8	1590	19	42 12/17 1630
19	Common salt (Sodium chloride) 300 lbs. per acre used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	27	7 7/16	1868	43	46	1890	28	6 15/17 1869
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive, No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	20	30 10/16	1603	31	2	1780	21	12 1613
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	21	19 8/16	1758	37	14	1970	22	16 1770

OAT PLOTS.

The quantity of seed sown per acre on the oat plots was 2 bushels in 1889 and 1890; 1½ bushels in 1891 to 1893, and 2 bushels from 1894 to 1905, inclusive. The varieties used were as follows: In 1889, Early English; in 1890 to 1893, Prize Cluster; and from 1894 to 1905, inclusive, the Banner. In 1905 Banner was sown May 4 and the plots were harvested August 10.

TABLE III.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Sixteen Years.		17th Season, 1905. Variety, Banner.		Average Yield for Seventeen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
1	Barn-yard manure, well rotted, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre were again used	51 $21\frac{7}{16}$	3214	64 4	3470	52 $15\frac{4}{17}$	3229
2	Barn-yard manure, fresh, 15 tons per acre each year to 1898, inclusive. No manure used from 1899 to 1905. In 1905 15 tons per acre were again used.	55 $23\frac{8}{16}$	3352	62 22	3650	56 $3\frac{1}{17}$	3370
3	Unmanured from the beginning.....	34 $28\frac{3}{16}$	1774	43 18	1750	35 $11\frac{8}{17}$	1773
4	Mineral phosphate, untreated, finely ground, 500 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899.....	35 $27\frac{14}{16}$	1892	52 22	2450	36 $27\frac{5}{17}$	1925
5	Mineral phosphate, untreated, finely ground, 500 lbs. nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	49 $12\frac{13}{16}$	2648	49 14	3240	49 $12\frac{14}{17}$	2673
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897, inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898.....	48 $32\frac{6}{16}$	2745	60 20	3640	49 $21\frac{11}{17}$	2798
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	49 $13\frac{14}{16}$	3121	57 32	3360	49 $30\frac{14}{17}$	3132
8	Mineral phosphate, untreated, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre used each year from 1888 to 1897, inclusive. In 1898 and 1899, 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	44 $19\frac{15}{16}$	2523	52 22	3560	45 $2\frac{3}{17}$	2584
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	38 $31\frac{7}{16}$	1999	50 —	2080	39 $19\frac{9}{17}$	2004

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF OATS—*Concluded.*

No. of Plot.	Fertilizers applied each year, from 1889 to 1893 or 1899. No fertilizers used from that time to 1905. Clover sown in 1899 and each year since with the grain and ploughed under in the autumn. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Sixteen Years.		17th Season, 1905. Variety, Banner.		Average Yield for Seventeen Years.	
		Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.	Yield of Grain.	Yield of Straw.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Bush. lbs.	Lbs.	Bush. lbs.	Lbs.	Bush. lbs.	Lbs.
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	47 $14\frac{8}{16}$	2645	57 22	1650	48 $-\frac{1}{17}$	2576
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	38 $31\frac{14}{16}$	2441	49 4	2190	39 $18\frac{4}{17}$	2426
12	Unmanured from the beginning.....	23 $30\frac{13}{16}$	1433	36 6	1580	24 $21\frac{6}{17}$	1442
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 bone again used as at first.....	35 $19\frac{11}{16}$	2005	48 28	2170	36 $12\frac{3}{17}$	2015
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers used again as at first.....	41 $3\frac{14}{16}$	2300	53 18	2980	41 $28\frac{12}{17}$	2340
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer used again as at first.....	46 $32\frac{14}{16}$	2729	55 ..	3010	47 $14\frac{16}{17}$	2746
16	Muriate of potash, 150 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	40 $4\frac{1}{16}$	2717	56 26	2620	41 $3\frac{16}{17}$	2241
17	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	45 $32\frac{1}{16}$	2766	59 4	2520	46 $24\frac{7}{17}$	2752
18	Sulphate of iron, 60 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	39 $13\frac{1}{16}$	2025	48 18	2690	39 $31\frac{16}{17}$	2064
19	Common salt (Sodium chloride), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer used again as at first.....	39 $13\frac{11}{16}$	1976	49 24	2510	40 $-\frac{5}{17}$	2067
20	Land plaster or gypsum (Calcium sulphate), 300 lbs. per acre, used each year from 1888 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	35 $23\frac{12}{16}$	2060	51 6	2170	36 $20\frac{2}{17}$	2066
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	36 $17\frac{9}{16}$	1904	52 22	2040	37 $15\frac{14}{17}$	1912

The one-tenth acre plots of wheat, barley and oats had by the end of 1903 become infested with several troublesome perennial weeds, hence it was thought best to sow only one-half of each plot with grain in 1904, devoting the other half to a hoed crop to clean the land. On this account no clover was sown on any of the cereal plots in 1904, and one-half of the wheat plots was sown with mangels, one-half of the barley plots with potatoes, and one-half of the oat plots with carrots, computing the yields of grain from a one-twentieth acre plot in each case.

INDIAN CORN PLOTS.

The experiments with the plots of Indian corn have been conducted with the object of obtaining the largest weight of well matured green fodder for the silo, and to have the corn so far advanced when cut, that the ears shall be as far as is practicable in the late milk or glazed condition. Each plot has been divided from the outset into two equal parts, on one of which—known as No. 1—one of the stronger growing and somewhat later ripening sorts has been tried, and on the other, marked No. 2, one of the earlier maturing varieties. During the first four years one of the Dent varieties was tested under No. 1. On the other half of the plot (No. 2) one of the Flint varieties was grown. For the first four years the No. 1 series was planted in drills 3 feet apart, using about 24 pounds of seed to the acre and thinning the plants, when up, to 6 or 8 inches, and the No. 2 in hills 3 feet apart each way with 4 or 5 kernels in a hill. During the past eight years both sorts have been grown in hills.

In 1900 no crop of Indian corn was grown on these plots, but clover was sown in its place on May 5, in the proportion of 12 pounds per acre. This made a strong growth, was cut twice during the season and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until May 20, 1901. It was then ploughed under about 6 inches deep, and harrowed well before the corn was planted. Clover was sown again in 1903, and ploughed under in May, 1904. The corn was planted in 1905, on May 16, and cut for ensilage September 14.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN, CUT GREEN FOR ENSILAGE.

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1898, clover discontinued.	Average Yield for Thirteen Years.		16th Season, 1905.		Average Yield for Fourteen Years.	
		½ Plot No. 1—weight of green fodder.	½ Plot No. 2—weight of green fodder.	½ Plot No. 1—Thoroughbred White Flint weight of green fodder.	½ Plot No. 2—Angel of Mid-night, weight of green fodder.	½ Plot No. 1—weight of green fodder.	½ Plot No. 2—weight of green fodder.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Tons. lbs.	Tons lbs	Tons. lbs.	Tons lbs	Tons. lbs.	Tons lbs
1	Barn-yard manure (mixed horse and cow manure (well rotted, 12 tons per acre, each year from 1888 to 1898 inclusive. No manure used from 1899 to 1905. In 1905 manure was again used as at first...	16 804	13 332	18 1160	15 1170	16 1076	13 634
2	Barn-yard manure (mixed horse and cow manure) fresh, 12 tons per acre each year from 1888 to 1898 inclusive. No manure used from 1899 to 1905. In 1905 manure was again used as at first.....	16 594	11 1161	18 30	15 760	16 809	11 1636
3	Unmanured from the beginning..... ..	7 399	5 826	6 140	7 836	7 258	5 1077

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN.

No. of Plot.	Fertilizers applied each year, from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Thirteen Years.		16th Season, 1905.				Average Yield for Fourteen Years.			
		¼ Plot No. 1—weight of green fodder.		¼ Plot No. 2—weight of green fodder.		¼ Plot No. 1—Thoroughbred White Flint, weight of green fodder.		¼ Plot No. 2—Angel of Midnight, weight of green fodder.		¼ Plot No. 1—weight of green fodder.		¼ Plot No. 2—weight of green fodder.	
		Per acre.		Per acre		Per acre.		Per acre		Per acre.		Per acre	
		Tons.	lbs.	Tons.	lbs	Tons.	lbs.	Tons.	lbs	Tons.	lbs.	Tons.	lbs
4	Mineral phosphate, untreated, finely ground, 800 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1893 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899.....	8	468	5	924	10	1300	10	1210	8	770	5	1567
5	Mineral phosphate, untreated, finely ground, 800 lbs., nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 800 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	11	1311	9	578	14	1870	12	1570	11	1721	9	1014
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 500 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1888 to 1897 inclusive. In 1898 500 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898.....	16	473	12	288	15	250	13	420	16	334	12	421
7	Mineral phosphate, untreated, finely ground, 500 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899, 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	15	449	11	660	14	840	12	1320	15	348	11	826
8	Mineral phosphate, untreated, finely ground, 500 lbs., wood ashes, unleached, 1,500 lbs., per acre, used each year from 1888 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	12	564	9	1292	14	1810	13	240	12	892	9	1726
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899.....	11	757	8	1651	13	1410	10	1250	11	1048	8	1876
10	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	13	1060	10	1234	13	1950	10	1660	13	1116	10	1261
11	Mineral superphosphate, No. 1, 350 lbs.; nitrate of soda, 200 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	16	532	12	1007	16	740	13	970	16	545	12	1130

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF INDIAN CORN—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1888 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the corn and ploughed under in May, 1901, before the corn was planted. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1898. Clover discontinued.	Average Yield for Thirteen Years.		16th Season, 1905.		Average Yield for Fourteen Years.	
		½ plot No. 1—weight of green fodder.	½ Plot No. 2—weight of green fodder.	½ Plot No. 1—Thoroughbred White Flint, weight of green fodder.	½ Plot No. 2—Angel of Midnight, weight of green fodder.	½ Plot No. 1—weight of green fodder.	½ Plot No. 2—weight of green fodder.
		Per acre.	Per acre	Per acre.	Per acre	Per acre.	Per acre
		Tons. lbs.	Tons lbs	Tons. lbs.	Tons lbs	Tons. lbs.	Tons lbs
12	Unmanured from the beginning.....	11 116	9 342	10 1640	10 320	11 86	9 466
13	Bone, finely ground, 500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 bone again used as at first.....	12 538	9 1206	13 1490	12 860	12 722	9 1559
14	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.....	12 1921	10 210	15 600	13 1200	13 213	10 647
15	Nitrate of soda, 200 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	12 1099	9 1481	12 710	10 1910	12 1075	9 1633
16	Sulphate of ammonia, 300 lbs. per acre, used each year from 1888 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	13 212	10 254	12 1130	11 1260	13 144	10 442
17	Mineral superphosphate, No. 1, 600 lbs.; muriate of potash 200 lbs.; sulphate of ammonia, 150 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	13 1149	10 306	14 780	12 1640	13 1251	10 639
18	Muriate of potash, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	10 255	7 960	14 710	13 770	10 783	7 1698
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and '90; (muriate of potash 200 lbs., substituted, each year since); dried blood, 300 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.....	12 765	9 297	15 1770	13 540	12 1203	9 812
20	Wood ashes, unleached, 1,900 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	11 257	8 1119	15 940	13 1430	11 800	8 1763
21	Bone, finely ground, 500 lbs.; sulphate of ammonia, 200 lbs.; muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.....	12 1387	7 1797	14 610	12 1800	12 1588	8 422

PLOTS OF MANGELS AND TURNIPS.

In conducting these experiments, the roots only have been taken from the land, the tops have always been cut off and left on the ground to be ploughed under, so that the plant food they have taken from the soil may be returned to it. One half of each one-tenth acre plot in the series has been devoted to the growth of mangels, and the other half to turnips, and these crops have been alternated from year to year. The preparation of the land has been the same for both these roots. Until 1900 it was

ploughed in the autumn after the crop was gathered, gang-ploughed deeply in the spring after the barn-yard manure had been spread on plots 1, 2 and 6, and after gang-ploughing, the other fertilizers were spread by scattering them evenly over the surface, after which it was all harrowed with the smoothing harrow, then made in ridges 2 feet apart, rolled and sown.

The variety of mangel principally grown was the Mammoth Long Red, and four pounds of seed were sown per acre each year.

The variety of turnip chiefly sown was the Prize Purple Top Swede. The land used for the turnips, which are usually sown later than the mangels, was prepared in the same manner as for the mangels. It was then allowed to stand until the day before sowing, when it was gang-ploughed shallow or cultivated to kill weeds and loosen the soil, ridged, rolled and sown. About 3 pounds of seed were sown per acre.

In 1900 and 1903, no crops of mangels or turnips were grown, but clover was sown in their place in May in the proportion of 12 pounds per acre. This made a strong growth and was cut twice each year during the season, and left on the ground to decay, so that when ploughed under, the land might get the full benefit of the clover crop. The clover was allowed to remain growing until near the middle of May, the second year following, by which time it had made a very heavy growth. It was then ploughed under about 6 inches deep and harrowed well, then made into ridges 2 feet apart. These were rolled with a hand roller, which flattened the ridges considerably and made a firm, even seed bed. The crops of clover and roots were alternated in this way, for the purpose of supplying humus and also of gaining information as to the fertilizing effect of green clover ploughed under on land to be used for growing roots.

In 1905, the mangels were sown on May 6, and pulled on October 17; the turnips were sown May 10, and pulled October 8. The yield per acre has been calculated in each case frm the weight of roots gathered from the whole plot.

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS.

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1899, clover discontinued.	Average Yield for Thirteen Years.		16th Season, 1905. Varieties.		Average Yield for Fourteen Years.	
				East Half Plot.	West Half Plot.		
		Mangels, Weight of roots.	Turnips, Weight of roots.	Turnips Purple Top Swede. Weight of roots.	Mangels Mammoth Long Red, Weight of roots.	Mangels, Weight of roots.	Turnips, Weight of roots.
		Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.
		Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.
1	Barn-yard manure (mixed horse and cow manure) well rotted, 20 tons per acre each year from 1889 to 1898 inclusive. No manure used from 1899 to 1905. In 1905 manure was again used as at first.....	21 1879	16 475	8 300	25 1060	22 358	15 1397
2	Barn-yard manure (mixed horse and cow manure) fresh, 20 tons per acre each year from 1889 to 1898 inclusive. No manure used from 1899 to 1905. In 1905 manure was again used as at first.....	20 1535	16 570	8 30	27 850	21 423	15 1467
3	Unmanured from the beginning.....	9 58	7 1669	2 1610	8 420	8 1949	7 998
4	Mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, used each year from 1889 to 1897, inclusive. In 1898 and 1899 a similar weight of the Thomas' phosphate was used. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899.....	8 1739	8 1307	3 1430	10 490	8 1922	8 649

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Continued.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Thirteen Years.		16th Season, 1905, Varieties.				Average Yield for Fourteen Years.			
				East Half Plot.		West half Plot.					
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Turnips, Purple Top Swede Weight of Roots.		Mangels, Mammoth Long Red, Weight of Roots.		Mangels, Weight of Roots.		Turnips, Weight of Roots.	
		Per Acre.	Per Acre.	Per Acre.		Per Acre.		Per Acre.		Per Acre.	
		Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
5	Mineral phosphate, untreated, finely ground, 1,000 lbs., nitrate of soda, 250 lbs., wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 500 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.	14	963	10	1099	5	1660	20	1880	14	1824	10	470
6	Barn-yard manure, partly rotted and actively fermenting, 6 tons per acre; mineral phosphate, untreated, finely ground, 1,000 lbs. per acre, composted together, intimately mixed and allowed to heat for several days before using, applied each year from 1889 to 1897 inclusive. In 1898 1,000 lbs. of Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1899 to 1905. In 1905 fertilizers again used as in 1898.....	17	1318	13	755	6	1820	22	560	17	1934	12	1893
7	Mineral phosphate, untreated, finely ground, 1,000 lbs. ; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years); nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1897 inclusive. In 1898 and 1899 1,000 lbs. of the Thomas' phosphate was used in place of the mineral phosphate. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	11	1162	9	1695	6	140	19	1370	12	243	9	1191
8	Mineral superphosphate, No. 1, 500 lbs. ; sulphate of potash, 200 lbs. in 1889 and 1890 (substituted by muriate of potash, 250 lbs. in 1891 and subsequent years) ; nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as in 1899.....	13	1690	11	1990	5	1770	17	1970	14	242	11	1175
9	Mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as in 1899	9	1444	9	1701	4	1050	16	480	10	313	9	991
10	Nitrate of soda, 300 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer use from 1900 to 1905. In 1905 fertilizer used again as in 1899.	14	294	9	1637	4	460	17	950	14	738	9	892
11	Sulphate of ammonia, 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer used again as in 1899.....	12	529	11	158	5	160	13	1740	12	743	10	1358

EXPERIMENTS WITH FERTILIZERS ON PLOTS OF MANGELS AND TURNIPS—*Concluded.*

No. of Plot.	Fertilizers applied each year from 1889 to 1898 or 1899. No fertilizers used from that time to 1905. Clover sown in 1900 in place of the roots and ploughed under in May, 1901, before the roots were sown. In 1903 clover was again sown and ploughed under in May, 1904. In 1905 fertilizers again applied as in 1899. Clover discontinued.	Average Yield for Thirteen Years.		16th Season, 1905, Varieties.		Average Yield for Fourteen Years.	
				East Half Plot.	West Half Plot.		
		Mangels, Weight of Roots.	Turnips, Weight of Roots.	Turnips, Purple Top Swede Weight of Roots.	Mangels, Mammoth Long Red, Weight of Roots.	Mangels, Weight of Roots.	Turnips, Weight of Roots.
		Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.	Per Acre.
		Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.	Tons. lbs.
12	Unmanured from the beginning	7 966	7 1407	2 430	7 250	7 918	7 675
13	Bone, finely ground, 500 lbs.; wood ashes, unleached, 1,000 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first	12 356	9 628	4 1040	13 1580	12 571	8 1989
14	Wood ashes, unleached, 2,000 lbs. per acre, used each year from 1889 to 1899, inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first.....	11 266	8 1523	5 840	12 600	11 422	8 1077
15	Common salt (Sodium chloride), 400 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	9 1814	8 896	3 1590	13 450	10 256	8 276
16	Mineral superphosphate, No. 1, 500 lbs.; nitrate of soda, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.....	12 1801	11 837	4 540	14 530	12 1983	10 1884
17	Mineral superphosphate, No. 1, 350 lbs.; wood ashes, unleached, 1,500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first....	13 735	11 301	3 1570	16 1150	13 1163	10 1319
18	Mineral superphosphate, No. 1, 500 lbs., muriate of potash, 200 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first.....	12 1762	11 1465	4 140	15 1580	13 150	11 443
19	Double sulphate of potash and magnesia, 300 lbs. per acre in 1889 and 1890 (muriate of potash, 200 lbs., substituted each year since); dried blood, 250 lbs.; mineral superphosphate, No. 1, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first	14 458	12 1395	4 960	16 1590	14 800	12 299
20	Wood ashes, unleached, 1,500 lbs.; common salt (sodium chloride), 300 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizers used from 1900 to 1905. In 1905 fertilizers again used as at first....	14 1922	11 881	3 810	17 300	15 214	10 1810
21	Mineral superphosphate, No. 2, 500 lbs. per acre, used each year from 1889 to 1899 inclusive. No fertilizer used from 1900 to 1905. In 1905 fertilizer again used as at first	14 1725	11 1544	3 110	16 1500	14 1977	11 382

BULLETINS ISSUED DURING 1905.

Five bulletins have been issued during the year: No. 48 on the 'results obtained in 1904 from trial plots of grain, fodder corn, field roots and potatoes.' This bulletin is the tenth of the series of crop bulletins issued from the Experimental Farm, and was prepared jointly by Dr. C. E. Saunders, Cerealist, and the Director. In this bulletin there are presented the results of a large number of experiments which were conducted at all the Experimental Farms during the season of 1904, with oats, barley, spring wheat, pease, Indian corn, turnips, mangels, carrots, sugar beets and potatoes, in plots of uniform size, and the crops grown under uniform conditions. Both the relative earliness and productiveness of the varieties are recorded. The average results are also given of these tests for the past five years, the varieties being arranged in order of their productiveness, for this period.

No. 49, 'the Potato and its Culture, with tests of Varieties found most useful.' This bulletin has been prepared by the Horticulturist of the Central Experimental Farm, Mr. W. T. Macoun. The potato crop is everywhere one of great importance to the community. In bulletin 49 there is presented in convenient form the results gained through a long course of experiments regarding the productiveness, quality and general usefulness of the best sorts of potatoes which have been under trial at the Experimental Farm during the past eighteen years. The number of named varieties tested during this period is over 800, besides several hundred seedlings. The relative merits of all these different sorts have been compared, especially as to their productiveness, quality and earliness in maturing. The best methods of preparing the land for this crop and of planting and cultivating are fully explained; particulars are also given as to the most successful remedies which have been adopted for the destruction of the injurious insects which attack this plant, and for the diseases which affect the vines and tubers. Select lists are also given of those varieties which have proved most useful and profitable.

No. 50 on 'The Milling and Chemical Value of the Grades of Wheat in the Manitoba Inspection Division, Crop of 1904.' This bulletin consists of two parts. Part I. on the Milling Value of the Grades of Wheat, has been prepared by Dr. C. E. Saunders, Cerealist, and Part II. on A Chemical Study of the Grain and Flour, by Mr. Frank T. Shutt, Chemist of the Dominion Experimental Farms.

The investigations reported on in this bulletin were undertaken in response to a request received from the Manitoba Grain Growers Association, asking that the experimental farm staff should determine as accurately as possible the value of each grade of wheat in the Manitoba Inspection Division, for milling purposes, also from the standpoint of chemical composition.

This subject is one of deep interest to the farmers of the Canadian North-west, and every effort has been made to make the investigation thorough and complete. The uniformity of the results obtained by these independent workers gives evidence of the care and accuracy with which the work has been conducted, and will doubtless inspire confidence in the reliability of the conclusions reached.

No. 51, on 'Bacon and Pigs in Canada, Notes on Breeding, Feeding and Managing Swine, with Reports of some Experiments.' This bulletin was prepared by Mr. J. H. Grisdale, Agriculturist of the Central Experimental Farm, and presents a summary of the experiments which have been conducted in reference to pork production since the beginning of this work at the experimental farm. Much information is also given regarding the selection of the best types of animals for carrying on this work, and of the different methods of management as to housing, pasturing, &c. Many facts are also presented in reference to the care and treatment of swine of different ages, and the most profitable methods of feeding them in the several stages of their growth. The swine industry has developed very rapidly in Canada during the past few years, and the facilities the country affords for the extension of this profitable branch of farming are practically unlimited. The useful information given in bulletin 51 will doubtless prove helpful to a large number of those engaged in this branch of farm work.

No. 52, on 'Insects Injurious to Grain and Fodder Crops, Root Crops and Vegetables,' prepared by Dr. James Fletcher, Entomologist and Botanist of the Dominion Experimental Farms.' The injuries annually caused by insects to farm crops, seriously reduce the profits arising from the labour of the farmer. Much of this loss is preventable, and the object of this bulletin is to supply that practical information which will enable the reader to deal with these several pests in the most effective manner and at the least cost. The concise accounts given of the life history and habits of the injurious species treated of, together with the illustrations, will provide the means whereby they may be readily distinguished. The remedies suggested for the destruction of these pests are, as a rule, of easy application and at the same time are very effective.

ANNUAL VISITS TO THE BRANCH EXPERIMENTAL FARMS.

The usual annual visits of inspection were made.

AGASSIZ was visited during the latter part of August. The weather was dry prior to and at the time of my visit and all the standing crops were in need of rain. The grain was all harvested and threshing was in progress. All the grain crops excepting wheat had been good, that had been injured by weevil. Hay had given very heavy returns, the field roots and corn were growing rapidly and promised to be well up to the average.

The apple crop was about medium, the yield of pears was light, plums variable, some of the more prolific varieties were fruiting well, while others gave only light returns. In the nut orchard the Japanese walnuts and chestnuts were yielding well, English walnuts and Spanish chestnuts both gave light crops, filberts gave more than an average yield.

INDIAN HEAD was twice visited, once on the way out to the coast about the middle of August, and the second time on September 11. The first visit was just before harvest began at the return visit in September. I found the grain practically all cut and no frost had occurred up to that time. The wheat in stook looked very heavy and the oats and barley equally good. Field peas were an excellent crop, and roots were growing rapidly and promised well. Potatoes also were giving excellent returns. This season carrots were sown earlier than usual and they were the best crop ever grown at this farm. Clover and Alfalfa were doing well, and Brome Grass and Western Rye Grass had both given excellent crops of hay; orchard grass and timothy had also done well. Corn was being cut on the day I arrived, September 11, and gave good returns. The next day, September 12, there was a light frost, the thermometer registering 31° F. at Indian Head. Most of the tender plants were cut, but no serious injury was done to any of the crops. Fruit, forest trees and ornamental trees and shrubs had all made excellent growth.

BRANDON also was visited twice. At the time of the first visit early in August most of the grain was ripening and several of the earliest sorts of barley had been cut. All varieties of grain promised well, oats were unusually heavy. On my return visit the grain had been harvested and the results had been most gratifying. Oats on the experimental plots had given yields varying with the different varieties from 137 bushels to 93 bushels per acre; the 39 different sorts under test averaged 111 bushels, 23 pounds per acre. Corn had given an excellent crop, and potatoes the largest crops ever grown on the farm. The weather had been very favourable for harvesting, and threshing was proceeding in every direction. Many of the cross-bred apples planted in the experimental orchards, both here and at Indian Head, were fruiting well and were attracting much attention from visiting farmers. Both of these farms were in excellent condition.

NAPPAN, Nova Scotia, was visited early in October. The crops of cereals which were all harvested had given yields well above the average; some of the oats gave from 80 to 90 bushels per acre, spring wheat from 20 to 35 bushels and barley from 35 to 49 bushels. Seeding was late in 1905, owing to a cold and wet spring, but favourable weather later on brought the grain crops on rapidly. Hay has given very good crops, much above the average. Field roots and Indian corn produced returns also above the average. The fruit orchards on this farm are doing well, most of the apples gave heavy crops; the other sorts of large fruits gave light returns; small fruits, however, did well.

ACKNOWLEDGMENTS.

I beg to tender grateful acknowledgments to those who have rendered me special service during the year. To the Department of Agriculture, St. Petersburg, Russia, for samples of early maturing varieties of barley brought from the northern grain growing sections of the Empire. To the United States Department of Agriculture for seed of Alfalfa from different countries for test at the experimental farms. To the Director of the Arnold Arboretum, Jamaica Plains, Mass., for seeds of shrubs and trees, also to the Director of the Royal Gardens, Kew, England, for many sorts of seeds of trees, shrubs and flowers.

I thank the officers of the Central and Branch Experimental Farms, for their earnest co-operation in carrying on the different divisions of the work. My acknowledgments are also due to those members of the staff who have assisted me in those branches of the work of which I have retained personal charge. To the farm foreman, Mr. John Fixter, who has carefully supervised the special tests of fertilizers and recorded the results. To Mr. George Fixter, to whom I am indebted for his watchful care over the distribution of samples of seed grain. To Mr. James Taggart for the care and industry he has displayed as foreman of the ornamental grounds, and to Mr. Wm. Ellis for his careful management of the plants and shrubs in the green houses, and the propagation and raising of plants for outside decoration; also for the useful service he has rendered in testing the vitality of seeds and in the taking of meteorological records.

I take pleasure also in bearing testimony to the faithful services of my secretary, Mr. Malcolm C. O'Hanly. The employees also of all the farms have my thanks for the interest they have taken in their work and the care with which they have discharged their respective duties.

WM. SAUNDERS,
Director of Dominion Experimental Farms.

REPORT OF THE AGRICULTURIST

(J. H. GRISDALE, B. AGR.)

DR. WM. SAUNDERS,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith reports upon the horses, cattle, sheep, swine and farming operations under my supervision during the past year.

I have to report a fairly successful year in the different branches of my division and in this connection I wish to acknowledge my indebtedness for assistance and interested co-operation in their various positions of the farm foreman, Mr. John Fixter, of the herdsman, Mr. C. T. Brettell, and of the dairyman, Mr. J. Meilleur.

During the year I have attended a number of meetings in various parts of Canada, and have conducted a number of student-judging contests, in addition to my regular work of supervising and directing the experimental feeding and farming operations at the Central Experimental Farm.

From December 1, 1904, to November 30, 1905, 2,090 letters were received, and 3,206 despatched by the agricultural division.

I have the honour to be, sir,
Your obedient servant,
J. H. GRISDALE,
Agriculturist.

LIVE STOCK.

The live stock now (December 1, 1905) occupying the different stables and pens under my charge include horses, cattle, sheep and swine.

HORSES.

The horses are kept for labour exclusively, although some experimental feeding is usually under way to gain some information as to the most economical methods of feeding draught horses, as well as experiments to determine the comparative values of different foods as forage for the same.

The horses are usually 19 in number, made up of:—
Thirteen heavy draught horses of Clydesdale and Percheron blood.
Five heavy driving horses.
One light driver.

CATTLE.

There are representatives of four breeds of cattle, viz.:—
Shorthorn, Ayrshire, Guernsey and Canadian. There are besides, a number of grade cattle and steers. These cattle are kept for breeding and feeding operations, mostly of an experimental character. Pure bred feeding animals are usually on sale, however, and a considerable number are sold in the course of the year.

PURE BRED BREEDING CATTLE.

The pure bred cattle in the barn at present are as follows:—
19 Shorthorns, including 5 bulls and 14 females.
20 Ayrshire, including 3 bulls and 17 females.
12 Guernseys, including 3 bulls and 9 females.
12 Canadians, including 1 bull and 11 females.

GRADE CATTLE.

At present the grades number 18 head, made up of 3 Shorthorn grades, 5 Ayrshire grades, 6 Guernsey grades, and 4 Canadian grades.

Steers.

Forty-seven steers are under feed at present. They are of different ages and breeding, and the number is made up of:
29 two-year-olds. 8 yearlings. 10 calves.

SHEEP.

Sheep are not kept in large numbers, only 42 being now in the pens. Two breeds are kept, namely: Shropshires and Leicesters.

There are 27 Shropshires, as follows:—2 Shearling rams, 5 ram lambs, 11 aged ewes, 6 shearling ewes and 3 ewe lambs.

There are 15 Leicesters, as follows:—10 ewes, 1 ewe lamb, and 4 ram lambs.

SWINE.

Ninety swine of all classes are now in the pens being fed experimentally or being kept for breeding purposes. The breeds kept are Berkshires, Tamworths and Yorkshires.

The Yorkshires are 39 in number, including: 2 stock boars; 24 breeding sows; 13 feeders.

The Berkshires are 12 in number, including: 1 stock boar. 8 breeding sows. 3 feeders.

The Tamworths are 15 in number, including: 1 stock boar; 8 breeding sows; 4 feeders; 2 young boars.

Crossbreds, 24 feeders.

HORSES.

There are 19 horses in the stables. These horses are expected to do the work in the various departments during the year. The work on the '200-acre farm' is but a part of their duties. They work in addition for the horticultural and cereal departments, as well as upon the lawns and in the Arboretum. In addition a large amount of hauling in connection with the different departments, as well as road making and messenger service, takes up much of their time.

HORSE LABOUR.

During the year from July 1, 1904, to June 30, 1905, the work done by the 19 horses kept in the stables here was equivalent to 5,763·9 days' work, distributed as follows:—Live stock, hauling feed, marketing stock, &c., 159·1 days; farm work (200-acre farm) 723·1 days; draining and care of roads, including removing snow and breaking roads in winter, 286·2 days; manure on 200-acre farm, 252·8 days; cleaning land, gathering stones, &c., 10 days; Arboretum, 130·5 days; horticultural division, 664 days; lawns, &c., 175 days; cereal division, 696·6 days; bulletins and reports to and from farm office, 103·6 days; poultry, 31·8 days; mail, including milk delivery, 176·3 days; omnibus service, including 3 horses

for omnibus, 2 horses for general driving and 1 horse for supervision of work, 2,345 days; work about greenhouse, outbuildings, sidewalks, exhibitions, &c., 169·9 days.

In estimating the cost of farming operations further on in this report, $3 per day is charged for team and driver. To feed and care for the horses costs 32⅓ cents per horse per working day, and the driver receives $1.72½ per 10-hour day. It is evident, therefore, that the team and driver cost $2.37½ per day, leaving a margin of 62½ cents, or 31½ cents, nearly, per horse per day for wear and tear.

FEEDING HEAVY HORSES.

The horses have been fed during the year along the lines indicated by recent experimental feeding as reported upon in 1904. The extensive use of bran in the place of oats has resulted in a very considerable saving in the cost of feeding during the year.

An experiment to gain more information as to the value of bran as a horse feed has been conducted this year and may be reported upon as follows:—

The horses, 10 in number, were divided into 5 groups of 2 each; the roughage ration in each case being mixed hay.

During the second period group 1 received a meal mixture of pure oats; group 2, 1 part bran to 1 part oats; group 3, 2 parts bran to 1 part oats; group 4, 2 parts oats, 1 part bran; group 5, oats 1 part, bran 3 parts. The oats were whole in every case.

The meal was fed in three nearly equal portions morning, noon and night, while only one-fifth of the hay was fed in the morning, as much at noon, and the balance or three-fifths at night.

To illustrate, one of the horses in group 1 received his rations as follows:—

Morning, hay 3 lbs.; meal mixture, 6 lbs.
Noon, hay 3 lbs.; meal mixture, 6 lbs.
Evening, hay 8 lbs.; meal mixture, 5 lbs.

FIRST PERIOD OF 21 DAYS.

BRAN FEEDING EXPERIMENT.

Group.	Average weight Sept. 15.	Meal Ration, kind.	Hay (all fed on timothy).	Amt. Meal Mixture fed in 21 days to 1 horse.	Amt. fed in 21 days. Timothy hay.	Daily Meal Ration.	Daily Hay Ration.	Average weight Oct. 6.	Loss — or Gain +	Value of Food consumed in one day.	Value of Food consumed in 21 days.	Cost of Food for 1 year if such a meal ration were fed.	Cost of food for 1 year if pure oats were fed.	Saving in 1 year by feeding such grain ration rather than pure oats.
				Lbs	Lbs	Lbs	Lbs	Lbs.	Lbs.	Cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	1,542	Oats ....2 Bran 1	Timothy	441	420	21	20	1,530	12—	28	6 09	102 20	109 50	7 30
2	1,606	Bran ....3 Oats 1	" .	441	357	21	17	1,556	50—	24	5 04	87 60	105 12	17 42
3	1,535	Oats ....3 Bran 1	" .	441	420	21	20	1,556	21+	29·5	6 09½	97 67	109 50	11 83
4	1,602	Oats pure.	" .	441	420	21	20	1,587	15—	30	6 30	109 50		
5	1,443	Bran ....1 Oats 1	" .	441	336	21	16	1,448	5+	25·5	5 35	93 07	104 02	10 95

SECOND PERIOD OF 21 DAYS.

BRAN FEEDING EXPERIMENT.

Group.	Average weight, Oct. 6.	Meal Ration, kind.	Hay (all fed on timothy.)	Amt. Meal Mixture fed in 21 days to 1 horse.	Amt. fed in 21 days. Timothy hay.	Daily Meal Ration.	Daily Hay Ration.	Average weight on Oct. 27	Loss — or Gain +	Value of Food consumed in one day.	Value of Food consumed in 21 days.	Cost of Food for a year if such a meal ration were fed.	Cost of Food for 1 year if pure oats were fed.	Saving in 1 year by feeding such grain ration rather than pure oats.
				Lbs	Lbs	Lbs	Lbs	Lbs.	Lbs.	Cts.	$ cts.	$ cts.	$ cts.	$ cts.
1	1,530	Pure Oats.	Timothy	441	420	21	20	1,551	21+	30	6 30	109 50	109 50	
2	1,556	Bran ....1 Oats 1	" .	441	357	21	17	1,548	8—	25·9	5 44	94 53	104 82	10 29
3	1,556	Bran ....2 Oats 1	" .	441	420	21	20	1,556	.....	25·8	5 42	94 17	109 50	15 33
4	1,587	Bran ....1 Oats 2	" .	441	420	21	20	1,576	10—	27·9	5 86	101 83	109 50	7 67
5	1,448	Bran ....3 Oats 1	" .	441	336	21	16	1,471	23+	23·6	4 95	86 14	103 36	17 22

The horses on these different rations were employed at various kinds of farm work. During the first three week's period most of the time was spent hauling corn to the silo (very heavy work) but during the last three weeks' period the work was more general in character, such as ploughing, cultivating, hauling roots, &c.

Group 1.—This group consisted of young horses in fair flesh. They were fed during the first period on hay and a concentrate ration of oats 14 lbs., bran 7 lbs. They may be said to have held their own in the three weeks, since they changed only 12 lbs. in weight, a slight loss. During the second period they received the same hay ration and a concentrate ration of pure oats. They did somewhat better during this time, possibly due to lighter work.

Group 2.—Strong mature horses in their prime, were fed during the first period on hay and a concentrate ration of bran and oats, 3 parts bran and 1 part oats. During the 3 weeks they fell off 50 lbs. each, but when changed to a ration of equal parts bran and oats, and given lighter work, they continued to lose weight, though not so rapidly since they lost only 8 lbs. in the 3 weeks.

Group 3.—Strong young horses 5 and 6 years old in good shape. This group were fed during the first period on a concentrate ration of 3 parts oats and 1 part bran. They made a slight gain, about 1 lb. per day, while on this ration, and when changed to a ration of 2 parts bran and 1 part oats during the second period neither gained nor lost during the 21 days.

Group 4.—Large geldings aged 9 and 10 years. They were fed hay and pure oats during the first period, during which 21 days they lost 15 lbs. per head. The ration was changed to bran 1, oats 2, when they still lost, though not quite so heavily, dropping only 10 lbs. in the 21 days.

Group 5.—Somewhat lighter horses, but in their prime were fed during the first period on hay and a concentrate ration made up of equal parts bran and oats. On this

ration they made a gain of 5 lbs. each in the 21 days. They were changed to a ration 3 parts oats and 1 part bran during the second period, on which ration they gained 23 lbs. each in the 21 days.

Taking the different rations in turn and examining them we find that:—

On pure oats there was in 1 group a loss of 15 lbs. per period and a gain of 21 lbs. per period in the other group, a net gain of 6 lbs. in 6 weeks.

On oats 2, bran 1 there was during first period a loss of 12 lbs. per horse and a further loss of 10 lbs. per horse during the second period, a total loss of 22 lbs. per horse in 6 weeks.

On oats 1, bran 1 there was during first period a gain of 5 lbs. per horse and a loss of 8 lbs. during the second period, or a net loss of 3 lbs. per horse in the 6 weeks.

On oats 1, bran 3 there was during the first period a loss of 50 lbs. per horse, but a gain of 23 lbs. during the second period, showing a total loss of 27 lbs. per horse in the 6 weeks.

On oats 1, bran 2 there was no change in 3 weeks.

On oats 3, bran 1 there was a gain of 21 lbs. in 3 weeks.

In conclusion, our experiments during 1905 go to corroborate our findings in 1904, when we concluded that bran might very safely and very profitably constitute a very large percentage of the meal ration of working horses. Probably equal parts bran and oats might be taken as a fair proportion in which to mix the two feeds. Where the mixture is being fed to horses with sound teeth there does not seem to be any particular advantage in grinding the oats.

DAIRY CATTLE.

The herd of dairy cattle during the year 1904 consisted of 35 females all told. They were:—

Ayrshires	8
Guernseys	5
Canadians	5
Shorthorns	6
Shorthorn grades	2
Ayrshire grades	4
Guernsey grades	4
Canadian grades	1

FEEDING THE DAIRY CATTLE.

Winter Feeding.

The roughage ration for the winter months was made up of straw, roots, ensilage and clover hay. The straw was cut, the roots were pulped and a mixture in the proportions of 400 lbs. ensilage, 200 lbs. roots and 30 lbs. cut straw prepared every second day. This mixture being put in a solid pile fermented more or less in a few hours, and the whole mass became quite juicy and apparently very palatable to the cows by the time it was being fed. It was fed at the rate of about 40 lbs. per 1,000 lbs. live weight of cows fed.

The meal mixture this year was made up of bran 50 parts, ground oats 25 parts, oil meal 25 parts. This mixture was fed at the same time as the roughage. Each cow received meal in proportion to the amount of milk she was producing. The amount fed varied from 2 lbs. per day up to 13 lbs. per day. The meal portion was thrown on top of the roughage the cow had just received and the whole mass given a slight stir so as to mix the meal with the roughage, thus ensuring the two being eaten together. After succulent roughage and meal had been consumed clover hay was fed at the rate

of about 2 lbs. per cow. The cows were fed in this way at 5.30 in the morning and 4 o'clock in the afternoon.

SUMMER FEEDING.

The cows were pastured as usual during the greater part of the summer months. They occupied one field of the three year rotation marked 'E' on page 82, and referred to there, as being under pasture in 1905. This field was able to carry about forty head of cattle for over two months and over thirty head for the next two months. When the pasture began to get bare it was supplemented by soiling crops cut and fed in the stables. A somewhat heavier grain ration was fed this year than during any previous year save 1904, on account of the greater extent to which soiling was carried on. The meal ration in summer consisted of oats and bran about equal parts. It was fed in amounts varying with the milk yield of the cows being fed, save in the case of heifers with their first calves, which usually received more than their records seemed to call for as it was desired to encourage and to cultivate in them the habit of maintaining a heavy and uniform flow of milk during the whole lactation period.

COST OF FEEDING.

In estimating the cost of feeding, the following prices were charged for feed stuffs, being the average local market rates for the same during the season of 1905 save in the case of ensilage and roots, which are charged for at the rate usually affixed in experimental feeding in all parts of America.

Pasture (per month)	$ 1 00	per cow.
Bran	16 00	per ton.
Gluten meal and oil meal	25 00	"
Oats and barley	21 00	"
Clover hay	7 00	"
Chaff	4 00	"
Roots and ensilage	2 00	"

In estimating the value of the product, 20 cents per pound is allowed for the butter and 15 cents per hundred pounds for skim milk and butter milk. The butter is manufactured on the farm and sells on the market at from 22 to 30 cents per pound, an average of about 25 cents per pound during the last year. This leaves about 5 cents per pound for cost of manufacture.

The following tables give in detail the particulars concerning each cow, herd statements for each of the pure bred herds, and monthly statements for all the herds combined.

The monthly statements for the whole milking herd show the total yield of milk for each month, its butterfat content, the amount of butter produced, the number of pounds of milk required for a pound of butter, and the average yield of milk per cow per diem. The highest average per cent fat was recorded in November and the lowest in February.

DAIRY CATTLE REPORTS.

During the year 35 different cows were milked for shorter or longer periods, as indicated on the first page of my report on dairy cattle, whereas in the subjoined 'herd reports' only 3 animals are reported upon in each breed.

In almost any dairy herd of any size some cows will be found that for some reason have given milk during only a small part of any given year. Where a large number of cows are being considered, one or two such cases introduced in estimating the average does not materially affect the same, but where the herds to be compared

are small the consideration of one or two such cases in one herd and no such cases in another makes an unjust difference in favour of the latter herd. To overcome this difficulty as far as possible, the records of three of the best cows in each herd, and of cows that had been in milk for the greater part of the year, have been taken and the average estimated from these records, rather than from the records of all cows of that particular breed that happened to calve during the year.

Report 1 is a summary of the more important points in connection with the year's work with the dairy herd.

Report 2 contains the individual records of all cows that gave milk during the year.

Report 3, 4, 5, 6, 7, 8, and 9 give the herd records of the several pure bred and grade herds under test.

REPORT I.

General Summary.

—	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.	Average.
No. of cows giving milk for month.	25	24	23	27	24	26	20	19	23	26	29	27	24·7
Lbs. of milk in month..	20,481	17,226	15,714	16,605	13,193	14,333	13,060	11,705	18,791	21,813	23,850	22,166	17·411
Average for 1 day.....	660·6	555·6	523·8	535·6	439·7	462·3	421·2	418·8	606·1	727·1	769·3	738·8	571·5
Daily average per cow.....	26·42	23·12	22·77	19·83	18·32	17·78	21·06	22·04	26·34	27·96	26·52	27·36	23·29
Per cent fat.....	4·11	4·34	4·08	4·39	4·49	4·04	3·99	3·64	4·02	4·01	3·82	3·96	4·07
Lbs. butter fat..	842·37	749·18	642·12	730·47	592·70	579·10	522·35	426·68	756·01	874.81	910·49	879·45	708·81
Lbs. butter.	991·02	881·38	755·43	859·29	697·29	681·29	610·45	501·97	889·42	1029·30	1071·05	1034·65	833·50
Lbs milk for 1 lb. b.tter.....	20·66	19·54	20·80	19·32	18·92	21·03	21·41	23·11	21·12	21·19	22·26	21·43	21·73

Name of Cows.	Age.	Date of dropping last calf.	Number of days in milk.	Daily average yield of milk.	Total milk for year.	Per cent of fat in milk.	Pounds butter produced in year.	Value of butter at 20 cts. per lb.	Value of skim milk at 15 cts. per 100 lbs.	Total value of product.	Amount meal eaten, valued at 1c. per lb.	Amount of roots and ensilage eaten, valued at $2 per ton.	Amount hay, valued at $7 per ton.	Months on pasture at $1 per month.	Total cost of feed for year.	Cost to produce 100 lbs. milk.	Cost to produce 1 lb. butter, skim-milk neglected.	Profit on 1 lb. butter, skim-milk neglected.	Profit on cow during year, labour neglected.
			Days.	Lbs.	Lbs.	p. c.	Lbs.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Mos	$ cts.	Cts.	Cts.	Cts.	$ cts.
Queeni .....(G.G.)	7	Apr. 5, '05	308	20·1	6,204	6·08	444·	88 80	8 64	97 44	1,767	12,570	1,089	4	38 05	61·3	8·5	11·5	59 39
Itchen e Lady.....(G.)	8	" 29, '05	281	29·2	8,211	4·34	420·	84 00	11 68	95 68	1,920	13,480	1,089	4	40 49	49·3	9·6	10·4	55 19
Belle Flower.....(G.G.)	7	Mar. 11, '05	309	27·9	8,621	4·14	425·17	85 03	12 29	97 32	2,127	13,500	1,098	4	42 60	51·6	10·01	9·99	54 72
Fortune.....(C.)	9	Dec. 26, '04	283	28·9	8,179	4·23	407·25	81 45	11 65	93 10	2,017	13,430	1,089	4	41 41	50·6	10·1	9·9	51 69
Denty.....(A.)	6	Mar. 2, '05	301	28·2	8,509	4·05	405.67	81 12	12 17	93 29	2,242	13,790	1,089	4	44 02	51·07	10·8	9·2	49 27
Deanie.....(G.)	8	Nov. 30, '04	315	24·3	7,679	4·33	391·92	78 38	10 93	89 31	2,030	13,170	1,089	4	41 28	53·7	10·5	9·5	48 03
Maggie .....(A.)	9	Feb. 21, '05	286	32·	9,152	3·66	395·	79 00	13 13	92 13	2,257	13,780	1,089	4	44 16	48·2	11·1	8·9	47 97
Zamora..... .....(C.)	9	July 2, '05	297	24·2	7,217	4·76	404·78	80 95	10 21	91 16	2,319	12,800	1,008	4	43 51	60·2	10·7	9·3	47 65
Jessica.....(A.)	11	Feb. 23, '05	273	33·2	9,165	3·54	382·16	76 43	13 07	89 50	2,257	13,790	1,135	4	44 33	48·3	11·5	8·5	45 17
Alma.....(G.G.)	4	" 5, '05	305	22·8	6,960	4·73	380·	76 00	9 87	85 47	2,050	12,870	1,089	4	41 18	59·1	10·8	9·2	44 69
Flossy Lyons.....(G.)	5	" 14, '05	293	21·003	6,154	5·18	375·20	75 04	8 66	84 70	1,895	12,570	1,089	4	39 33	63·8	10·4	9·6	44 37
Polly.....(G.C.)	10	Mar. 8, '05	284	26·9	7,651	4·08	367·88	73 57	10 92	84 49	2,125	13,170	1,089	4	42 33	55·1	11·4	8·6	42 26
Beauty.....(G.G.)	4	Aug. 15, '04	293	22·9	6,715	3·62	290·02	58 00	9 63	67 63	1,634	9,340	1,089	4	33 49	49·8	11·5	8·5	34 14
Cherry.....(G.S.)	5	Sept. 14, '04	252	26·8	6,767	3·98	317·22	63 44	9 50	72 94	1,859	13,550	1,889	4	39 96	59·5	12·5	7·5	32 98
Bloomer ..... (A)	6	Mar. 18, '05	266	27·	7,199	3·77	319·63	63 92	10 32	74 24	1,997	13,790	1,089	4	41 57	57·7	13·0	7·	32 67
Countess.....(G.A.)	7	June 18, '05	261	26·5	6,929	3·92	319·74	63 94	9 91	73 85	2,040	13,790	1,089	4	42 00	60.6	13·1	6·9	31 85
Marchioness. .....(S.)	11	Mar. 4, '05	302	23·7	7,177	3·68	311·27	62 25	10 40	72 65	2,344	14,290	1,134	4	45 70	63·6	14·6	5·4	26 95
Alice. .....(G.A.)	4	" 28, '05	307	21·9	6,727	3·35	265·58	53 11	9 69	62 80	1,859	13,170	1,089	4	36 57	54·3	13·2	6·8	26 23
Rosy.....(G.S.)	6	Jan. 9, '05	300	22·2	6,679	3·54	278·76	55 75	9 60	65 35	1,817	13,170	1,089	4	39 15	58 6	13·1	6·9	26 20
Exilée.....(C.)	10	.....	103	37·01	3,815	4·82	183·17	36 63	5 44	42 07	829	3,980	.....	4	16 27	45·	8·8	11·2	25 80
Margerie.....(A.)	3	Sept. 28, '04	253	21·9	5,562	3·98	261·04	52 20	7 95	60 15	1,822	9,650	1,089	4	35 68	64·1	13·6	6·4	24 47
Laura. .....(G.A.)	9	Apr. 6, '05	215	29·2	6,373	3·27	245·21	49 04	9 19	58 23	1,432	13,170	1,089	4	35 30	55·3	14·3	5·7	22 93
Gurta.....(A.)	4	Oct. 31, '04	307	21·3	6,558	3·48	271·54	54 30	9 38	63 68	1,942	13,580	1,089	4	40 81	62·2	15·02	4·98	22 87
Flavia..... ..(A.)	3	Sept. 23, '04	253	22·5	5,713	3·69	248·78	49 75	8 79	58 54	1,819	10,690	1,089	4	36 69	64·2	14·7	5·3	21 85
Legacy.....(A.)	3	Oct. 7, '04	242	23·3	5,641	3·61	239·83	47 96	8 10	56 06	1,724	10,690	1,089	4	35 74	63 3	14·9	5·1	20 32
Cora.....,....(A.G.)	3	Jan. 30, '05	125	25·9	3,239	4·01	152·82	31 56	4 63	36 19	814	4,290	397	4	17 82	55·01	11·6	8·4	18 37
Darlington.....(S.)	3	Oct. 21, '04	222	21·9	4,862	3·71	212·47	42 49	6 97	49 46	1,696	9,640	1,089	4	34 41	70·7	16·1	3·9	15 05
Ruby.. .....(G.)	8	Sept. 28, '04	296	14·8	4,394	4·54	236·23	47 24	6 23	53 47	2,035	13,180	1,089	4	41 34	94·08	17·5	2·5	12 13
Jessica .....(S.)	4	Feb. 9, '05	252	16·2	4,112	4·05	196·09	39 21	5 54	44 75	1,615	13,170	1,089	4	37 13	90·7	18·9	1·1	7 62
Janet..... ... (S.)	4	Nov. 23, '04	258	16·7	4,335	3·88	198·23	39 65	6 20	45 85	1,917	13,480	1,089	4	40 46	93·3	20·9	·9	5 39
Poupée.....(C.)	2	Jan. 16, '05	142	17·7	2,522	3·97	115·88	22 16	3 61	25 77	918	5,375	586	4	20 59	81·6	17·8	2·2	5 18
Duchesse..... . (C.)	4	July 21, '04	235	18·4	4,332	3·65	186·47	37 29	6 21	43 50	1,801	13,480	1,089	4	39 30	90·7	21·68	*1·08	4 20
Clatford Spot..... (G.)	11	June 10, '05	254	15·1	3,846	4·15	176·	35 20	5 45	40 65	1,887	13,180	1,089	4	39 86	103·7	22·6	*2·6	0 79
Duchess ....(S.)	4	Nov. 27, '04	192	17·4	3,346	3·91	142·51	29 50	4 80	34 30	1,819	13,790	1,089	4	39 79	118·	27·8	*7·8	*5 49
Illuminata.. .....(S.)	5	Apr. 18, '05	31	3·5	109	3·76	4·10	0 97	0 16	1 13	1,253	13,480	1,089	4	33 82	.....	.....	.....	*32 69

* Loss.

Shorthorns—																		
Marchioness	11	Mar. 4, '05	302	23·7	7,177	3·68	311·27	62 25	10 40	72 65	2,344	14,290	1,134	4	45 70	63·6	14·6	5·4	26 95
Darlington	3	Oct, 21, '04	222	21·9	4,862	3·71	212·47	42 29	6 97	49 46	1,696	9,640	1,089	4	34 41	70·7	16·1	3·9	15 05
Jessica	4	Feb. 9, '05	252	16·2	4,112	4·05	196·09	39 21	5 54	44 75	1,615	13,170	1,089	4	37 13	90·7	18·9	1·1	7 62
Average	..	.....	259	20·8	5,834	3·81	239·94	47 92	7 64	55 62	1,885	12,367	1,104	4	39 08	75·	16·5	3·5	16 54
Ayrshires—																			
Denty	6	Mar. 2, '05	301	28·2	8,509	4·05	405·67	81 12	12 17	93 29	2,242	13,790	1,089	4	44 02	51 7	10·8	9·2	49 27
Maggie	9	Feb. 21, '05	286	32·	9,152	3·66	395·	79 00	13 13	92 13	2,257	13,780	1,089	4	44 16	48·2	11·1	8·9	47 97
Jessie A	11	Feb. 23, '05	273	33·2	9,165	3·54	382·16	76 43	13 07	89 50	2,257	13,790	1,135	4	44 33	48·3	11·5	8·5	45 17
Average	..	.....	287	28·7	8,942	3·75	394·28	78 85	12 79	91 64	2,252	13,787	1,104	4	44 17	49·2	11·1	8·9	47 47
Guernseys—																			
Itchen Lady	8	Apr. 29, '05	281	29·2	8,211	4·34	420·	84 00	11 68	95 68	1,920	13,480	1,089	4	40 49	49·3	9·6	10·4	55 19
Deanie	8	Nov. 30, '04	315	24·3	7,679	4·33	391·92	78 38	10 93	89 31	2,030	13,170	1,089	4	41 28	53·7	10·5	9·5	48 03
Flossie Lyons	5	Feb. 14, '05	293	21·	6,154	5·18	375·20	75 04	8 66	84 70	1,895	12,570	1,089	4	39 33	63·8	10·4	9·6	44 37
Average	..	.....	296	24·8	7,348	4·62	395·70	79 14	10 42	89 89	1,948	13,073	1,089	4	40 33	55·6	10·2	9·8	49 20
Canadians—																			
Fortune	9	Dec. 26, '04	283	28·9	8,179	4·23	407·25	81 45	11 65	93 10	2,017	13,430	1,089	4	41 41	50·6	10·1	9·9	51 69
Zamora	9	July 2, '05	297	21·2	7,217	4·76	404·78	80 95	10 21	91 16	2,319	12,800	1,008	4	43 51	60·2	10·7	9·3	47 65
Exilée	10	.....	103	37·01	3,815	4·82	183·17	36 63	5 44	42 07	829	3,980	.....	4	16 27	45·	8·8	11·2	25 80
Average	..	.....	228	30·	6,404	4·60	331·73	66 34	9 10	75 44	1,722	10,070	.....	4	33 73	51·9	9·9	10·1	41 71
Ayrshire Grades—																			
Countess	7	June 18, '05	261	26·5	6,929	3·92	319·74	63 94	9 91	73 85	2,040	13,790	1,089	4	42 00	60·6	13·1	6·9	31 85
Alice	4	Mar. 28, '05	307	21·9	6,727	3·35	265·58	53 11	9 69	62 80	1,559	13,170	1,089	4	36 57	54·3	13·2	6·8	26 23
Laura	9	Apr. 6,'05	215	29·2	6,373	3·27	245·21	49 04	9 19	58 23	1,432	13,170	1,089	4	35 30	55·3	14·3	5·7	22 93
Average	..	.....	261	25·8	6,676	3·51	276·84	55 36	9 59	64 96	1,677	13,376	1,089	4	37 96	56·7	13·5	6·5	27 00
Shorthorn Grades—																			
Cherry	5	Sept. 14, '04	252	26·8	6,767	3·98	317·22	63 44	9 50	72 91	1,859	13,550	1,089	4	39 96	59·5	12·5	7·5	32 98
Rosy	6	Jan. 9, '05	300	22·2	6,679	3·54	278·76	55 75	9 60	65 35	1,817	13,170	1,089	4	39 15	58·6	13·1	6·9	29 59
Average	..	.....	276	24·5	6,723	3·76	288·	59 60	9 55	69 15	1,838	13,360	1,089	4	39 55	59·	12·8	7·2	29 59
Guernsey Grades—																			
Queenie	7	Apr. 5, '05	308	20·1	6,204	6·08	444·	88 80	8 64	97 44	1,767	12,570	1,089	4	38 05	61 3	8·5	11·5	59 39
Belle Flower	7	Mar. 11, '05	309	27·9	8,621	4·14	425·17	85 03	12 29	97 32	2,127	13,500	1,098	4	42 60	51·6	10·1	9·99	54 72
Alma	4	Feb. 5, '05	305	22·8	6,960	4·73	380·00	76 00	9 87	85 47	2,050	12,870	1,089	4	41 18	59·1	10·8	9·2	44 69
Average	..	.....	307	23·6	7,262	4·98	416·39	83 28	10 27	93 41	1,981	12,980	1,092	4	40 61	57·3	9·8	10·2	52 93

* Loss.

FEEDING DAIRY CATTLE.

For the Canadian dairy farmer the chief aim in his feeding operations for milk production must ever be to produce the milk at as low a cost as possible. A not uncommon error, however, if one may judge by the average returns from Canadian dairy herds, is to attempt to lower cost by so decreasing the amount of food fed or by supplying food of such poor quality as to make heavy milk yields impossible. Profitable milk yields and very light rations do not go together. An abundance of food low in nutritive value is equally certain to prove unsatisfactory. To illustrate, a cow with the capacity to consume 25 lbs. of dry matter per day will not be profitable if fed only 20 lbs. per day. Neither will she be likely to prove more profitable even though she receive the 25 lbs. of dry matter per day if that dry matter be made up chiefly of such coarse forage as straw and chaff. It must be borne in mind, however, that it is quite possible to feed too heavy a ration and also that one may easily feed a ration too rich in nutritive elements as for instance by feeding too large a proportion of meal in the ration.

Our experiments and experience go to show that certain qualities should characterize rations for dairy cows if they are to prove satisfactory. In the first place the food should be so abundant as to quite satisfy the cow without encouraging her to leave anything over. In the second place it should be so palatable as to induce her to eat all she can get. Lastly it should be so high in food value as to insure a sufficient amount of material for milk production being left after life has been maintained. The best and most available aids to palatability at the command of the farmer are succulent feeds, such as roots and ensilage; while clover hay and bran are usually the most economical sources of such nutritive elements as are most essential for milk production.

Of succulent feeds there is usually a sufficiency in summer, but even the summer supply frequently falls short in such districts as are heavily stocked. Of the two seasons it is quite certain that an abundance of green feed in summer is even more important than in winter, hence the necessity of every dairy farmer making provision by means of soiling crops of (1) pease and oats, (2) oats and vetches, (3) pease, oats and vetches, (4) clover, (5) alfalfa, (6) green corn or (7) white turnips, or possibly better still by means of (8) the summer silo filled with corn or clover ensilage.

In winter, in addition to corn, clover or other ensilage, sugar beets, mangels and turnips may be provided and are certain to prove profitable additions to the dry ration usually fed.

The value of a small amount of such succulent food in winter can scarcely be overestimated. Where it is desired to feed stock very cheaply, yet in such a way as to insure good returns during the winter and good preparation for the next summer's work, ensilage or roots are certainly the most economical foods that can be used.

The amount of such foods to use will depend chiefly upon the supply, since the ration might quite easily include as much as 50 lbs. roots or 40 lbs. ensilage per average sized adult animal. Hence if all of such food as could be fed were to be fed, a supply of from 5 to 8 tons should be provided for each full grown cow. This would of course provide for summer as well as for winter feeding.

In feeding succulent foods probably the best preparation is to mix chaff, cut straw or cut hay in the proportion of 5 lbs. of one of them or a mixture of all three to 100 ensilage, or pulped roots or a mixture of the two. Probably the best roughage ration possible of preparation would be cut clover 5 lbs., pulped sugar beets 40 lbs., ensilage 60 lbs., mixed every second day in quantities sufficient for 48 hours feed and mixed, if possible, 6 hours before the first feed is to be fed therefrom. Mangels are exceedingly valuable as feed for cows but not equal to sugar beets. Sugar beets it must be remembered, however, cost more per ton to produce. Turnips are not to be recommended for cows whose milk is to be manufactured into butter or cheese nor for herds from which cream is to be sold. Corn ensilage is probably about the best that could be provided. A mixture of good corn and second growth clover is, however, even more to be desired than pure corn ensilage. Clover ensilage if well made is of very high feeding value but is generally more difficult to procure of good quality than the corn ensilage where

corn will grow to a fair state of maturity. Pease and oats cut in the milk stage of the oats will make fair ensilage as will almost any other cereal and legume mixture cut at the same stage, but such mixtures seem to be rather unsatisfactory and are not commonly used.

For concentrates or meal feeds the common farm grains, oats, barley and pease do very well, particularly for summer feeding. In winter the addition of bran, shorts, oil meal, gluten, or cottonseed meal has been found to give excellent returns.

The amount to feed should depend upon the possibilities of the cow as a milk producer and upon the stage she has reached in the lactation period. Very heavy meal rations are not as a rule as profitable as those of medium character.

The meal had better be fed along with the roughage.

KEEPING RECORDS.

The effort to interest dairymen in the returns from their individual cows has been continued, and many farmers seem to be awakening to a knowledge of the fact that the improvement of the whole herd demands the study of the unit; that is, a close acquaintance with the expenditure upon the individual cow and the returns from the same.

This can be determined in no other way than by keeping an exact record of the daily milk yield. A record of the daily food consumption would also be of great use if it could be kept.

Many farmers who have been keeping such records for some time report very strongly in favour of this line of work.

As soon as the farmer sets to work to know what his cows are doing by keeping a record he finds himself much more closely in touch with his business. He sees at once the effect of better care and better feeding. He notes the great difference in returns between the best and the worst cows in his herd and cannot help but determine to get rid of the poor ones and replace them with good ones. Even the poor cows are improved because better feeding is almost certain to be tried and quite certainly poor feeding is responsible for many of our unprofitable dairy cows and even for many unprofitable dairy herds.

To facilitate the keeping of such records and to help in the building up of dairying interests in Canada forms similar to the following are supplied on application:—

DAIRY MILK RECORD.

Herd belonging to.....
Post Office .....
Record for week ending.....

(This form supplied free by Live Stock Division, Central Experimental Farm, Ottawa, Ont.)

COWS.

Day.	Time.																Total for Day.
Sunday	Morning																
	Evening																
Monday	Morning																
	Evening																
Tuesday	Morning																
	Evening																
Wednesday	Morning																
	Evening																
Thursday	Morning																
	Evening																
Friday	Morning																
	Evening																
Saturday	Morning																
	Evening																
Total	Week																

(Reverse)

CENTRAL EXPERIMENTAL FARM.

Wm. Saunders, Director. J. H. Grisdale, Live Stock and Agriculture.

MILK RECORDS.

1. The profitable dairy cow must give over 5,000 pounds of milk each year. To know the value of a cow, her total annual yield of milk must be known. The only way to know this is to keep a record of her daily milk yield.

2. The form on the other side of this sheet is intended to help progressive dairy farmers by supplying them with a simple and convenient sheet for the keeping of the milk records of their individual cows. A study of such records will soon indicate which cows should go to the butcher. We would be pleased to receive a summary of your record. If you have no summary forms write us.

3. Such records are being kept by hundreds of successful dairymen to-day. Many of these men attribute their success to the keeping of such records. Why not give the thing a trial if you are a dairyman? It will increase your milk product. It will lighten your labour since your interest will be increased in your work, and 'interest lightens labour.' It will show you the unprofitable cow the 'boarder.' You cannot get rid of her too quickly.

4. For weighing the milk a simple spring balance may be secured for from one to three dollars. If your local dealer cannot supply you, write the undersigned for particulars. A small platform scale is fairly convenient, but we find the spring balance preferable.

5. Many farmers keep records of the amount of food fed to individual cows. If you would like to do so, sample forms would be sent free on writing J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa, Ont.

VALUES OF FOODS FOR MILK PRODUCTION.

During the year a number of different bye-products recommended by the manufacturers who put them on the market as particularly valuable for milk production, have been given a trial.

Those tried this year upon which we think it advisable to report are: 'Spirit Grains,' a bye-product from distilleries; 'Meal Seeds,' small grain and more or less refuse and weed seeds ground together a bye-product from cereal foods factories; and 'Pea Dust,' another bye-product from cereal foods factories, being the small peas broken parts, &c., of peas not suitable for sale as prepared peas of some description.

MEAL SEEDS.

Four Shorthorn cows were taken and a record of their work for 11 days previously is shown. They were fed the same roughage as usual for 17 days longer but in the place of the usual meal ration of bran 600 lbs., oats 300 lbs., and oil meal 300 lbs. at the rate of about 8 lbs. per day, they were given an equal amount of 'Meal Seeds.'

The cattle did not like the meal seeds quite so well as the regular meal ration. The data given below show the estimation in which this bye-product may be held as a feed for cows in milk. The reader will remember that under even the best conditions cows in milk are likely to fall off about 5 per cent in the time occupied by the experiment.

Number of cows under test	4	
Average meal ration (bran, oats, oil meal before test)	8	lbs.
Average hay ration before test	5	"
Average ensilage and roots ration before test	70	"
Average yield of milk per day during 11 days while on regular meal ration	88 6/11	"
Milk produced by group first day of 11-day period	90	"
Milk produced by group average of last 7 days before feeding 'Meal Seeds'	88	"
Average yield of milk per day for 17 days while being fed 'meal seeds'	80 1/3	"
Average yield of milk per day during first week on 'meal seeds'	83 5/7	"
Average yield of milk per day during last three days on 'meal seeds'	78 1/2	"
Rate of decrease	10%	
Normal rate of decrease for period	5%	

The above data show a tendency on the part of cows to decrease considerably more rapidly than they should be doing, due no doubt to their being on a meal ration of 'meal seeds.' We may fairly safely conclude, therefore, that as a sole meal feed for cows in milk they are not to be very highly recommended. They might, of course, be fed to some profit if mixed with other concentrates so that they made up only a part of the meal ration.

SPIRIT GRAINS.

Four cows of different breeding were taken and a record of their work for 11 days previously is shown. They were then fed the same roughage as usual for 17 days, but in the place of the usual meal ration of bran 600 lbs., oats 300 lbs., and oil meal 300 lbs. at the rate of about 8 lbs. per day, they were given an equal amount of 'spirit grains.' The cattle liked the 'spirit grains' quite well, and the results speak for themselves, it being remembered, of course, that milking cows were likely to fall off about 5 per cent in time covered by the experiment.

Number of cows under test	4	
Average meal ration (bran, oats, oil meal before test)	8	lbs.
Average hay ration before test	5	"
Average ensilage and roots before test	60	"
Average yield of milk per day for 11 days before feeding of 'spirit grains' began	80 1/3	"
Milk yielded by group first day of 11-day period	81 1/4	"
Milk yielded by group average of last 7 days before feeding 'spirit grains'	79 5/7	"
Average yield of milk per day for 17 days while being fed 'spirit grains'	79 3/4	"
Average yield of milk per day during first week on 'spirit grains'	75 1/7	"
Average yield of milk for last 3 days on 'spirit grains'	83	"
Rate of decrease	1/2%	
Normal rate of decrease for period	5%	

The above data appear to show a tendency on the part of the cattle to increase in milk flow while being fed 'spirit grains' once the effects of the change of feed was passed. Such a tendency on the part of cows being fed a certain ration is exactly what indicates a good sort of food being fed. Since the only change made in the

ration was in the substitution of 'spirit grains' for meal, 'spirit grains was evidently a good food.

PEA DUST.

Four cows of different breeding were used in the trial. To make a comparison of 'pea dust' with the regular ration made up of bran 6 parts, oats 3 parts and oil meal 3 parts possible a record is given of the feed and milk for 11 days immediately previous to the 17 days during which the regular meal ration was replaced by 'pea dust.'

The 'pea dust' was not very well liked by the animals and some little difficulty was experienced in getting them to eat as great a weight of it as they had been eating of the regular meal mixture. The data given below show the estimation in which this bye-product may be held as a feed for cows in milk. It will, of course, be remembered that under favourable conditions cows might be expected to fall off about 5 per cent in the time covered by the experiment.

Number of cows under test	4
Average meal ration (bran, oats, oil meal before test)	8 lbs.
Average hay ration before test	5 "
Average ensilage and roots ration before test	60 "
Average yield of milk per day during 11 days while on regular meal ration	88 4/11 "
Milk produced by group first day of 11-day period	89 1/2 "
Milk produced by group average of last 7 days before being fed 'pea dust'	87 5/7 "
Average yield of milk per day for 17 days while being fed 'pea dust'	84 1/3 "
Average yield of milk per day for first week while being fed 'pea dust'	85 4/7 "
Average yield of milk per day for last 3 days while being fed 'pea dust'	85 1/3 "
Rate of decrease	4 1/2%
Normal rate of decrease for period	5%

The above data show that 'pea dust,' in spite of being somewhat unpalatable to cows is a most excellent ration for milk production. The cows, though not eating quite as much of the 'pea dust' as of the regular meal, did quite as well when fed on 'pea dust' as when on the regular meal mixture.

FEEDING REFUSE APPLES TO DAIRY COWS.

Another test has been made of the value of apples as a food for milk production. Apples were fed at the rate of 22 lbs. per day during 4 weeks, with the result that there was a slight increase in the rate of milk production as compared with a considerable decrease when apples were not fed. The following table gives all data of the experiment:—

—		Method of Feeding.						Summaries.	
		1st period of 1 week.		2nd period of 2 weeks.		3rd period of 2 weeks.			
		Group A.	Group B.	Group A.	Group B.	Group A.	Group B.	Summary.	Summary.
		Preliminary.	Preliminary.	Fed Apples.	No Apples.	Fed Apples.	No Apples.	Fed Apples.	No Apples.
		Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.	Number in group, 3.
Average weight to start period	Lbs.	972	978	953	955	993	985	969	969
Average weight at end of period	"	953	955	993	985	1,022	1,015	1,004	1,003
Loss — or gain	"	— 19	— 23	+ 40	+ 30	+ 29	+ 30	+ 35	+ 34
Meal fed group in 1 day	"	18	18	18	18	18	18	18	18
Hay fed group in 1 day	"	9	9	9	9	9	9	9	9
Ensilage fed group in 1 day	"	120	115	48	130	104	45	46½	117
Apples fed group in 1 day	"			60			75	67½	
Meal fed group in period	"	126	126	252	252	252	252	252	252
Hay fed group in period	"	63	63	126	126	126	126	126	126
Ensilage and roots fed group in period	"	840	810	672	1,820	1,455	630	651	1,638
Apples fed group in period	"			840			1,100	970	
Value of feed fed group in period	$	2 31	2 28	4 76	4 76	4 40	4 40	4 58	4 58
Value of feed fed 1 cow in 1 day	Cts.	11	11	10½	10½	10½	10½	10½	10½
Milk produced by group in period	Lbs.	370	321	802⅓	711	766	676	739	738
First day's milk from group	"	50	45	56	48½	58½	48½	52½	53½
Second " "	"	51½	44½	57	54	58½	49½	53¼	56¼
Average daily yield of group during 1st week	"	52⅝	45⅝	57	50⅝	57⅝	49	53	54
" " 2nd week	"			57¾	51	52	47⅜	52½	51½
" " 2 weeks	"			57⅞	50⅝	54⅝	48⅜	52¾	52⅝
Next to last day's milk from group	"	53	47	60	51½	54	48	54	52¾
Last day's milk from group	"	55	49½	56½	48½	51½	47½	52	50
Change in rate of daily milk yield in 2 weeks	"	+ ½	+ 3	+ 3	— 1½	— 5¾	— 1½	+ ¼	— 3½
Per cent change in rate of daily milk yield	p. c.	+ 1	+ 6⅔	+ 3	— 2½	— 10	— 2½	+ ½	— 7

BEEF PRODUCTION.

EXPERIMENTS IN 1903-4.

The lines of experiment followed in the winter of 1903-4 were:—Influence of age on cost of beef; influence of manner of housing, *i.e.*, feeding loose vs. feeding tied; baby beef; values of feeds.

The steer feeding operations may be considered successful from a financial point of view since the selling price covered the cost of the steers, the cost of the feed at market prices, and left a good margin for profit. Full particulars are given in the group reports.

Of course it must always be remembered in reading the reports that the cost of caring for and feeding the steers is not included in the estimate of the cost of production. There is not the least doubt but that where feeding operations are conducted in such a manner as to require a reasonable amount of labour for the number of animals fed the manure is of a value quite equal to the cost of the labour.

In our beef feeding operations here high values are put on hay, straw ensilage and roots, while the market prices are charged for meal of all kinds. If only cost of production were charged for the straw, hay, roots, ensilage and such meal as is produced on the farm a very much higher margin of profit could be shown and there would still be saved the cost of marketing, a no small item for roots, hay and straw, to say nothing of ensilage. Further, by beef feeding operations where it is not convenient or not desired to keep dairy cattle on the farm much valuable fertilizing material is kept on the farm that would otherwise have been lost, hence the feeder should be satisfied with somewhat smaller returns than might be expected from the sale of the raw material.

SHORT FEED VS. LONG FEED.

Not infrequently the feeder when starting his operations in the fall is uncertain as to whether he should try to fit for an early or a late market. Generally speaking it may be said that steers rushed for an early market put on gains considerably more cheaply than those fed for a longer time. Further, steers fed for a short period are likely to consume relatively more roughage in comparison with the necessary meal than are those fed for a long period. To illustrate the two points made, lot A (discussed below) fed for 127 days cost $6.76 to lay on 100 lbs. of increase in live weight and consumed only 4,937 lbs. of meal along with 68,328 lbs. roots and ensilage about 1 of meal to 14 of roots and ensilage, while lot B, fed for 202 days consumed 10,356½ lbs. meal along with only 91,558 lbs. ensilage and roots or about 1 of meal to 9 of roots and ensilage. The rates of gain as will be seen below were practically the same.

Lot 'A'—Short Feed Steers.

Number of steers in lot	9	
First weight, gross, Nov. 12, 1904	10,880	lbs.
First weight, average	1,209	"
Finished weight, gross, Mar. 21, 1905	12,995	"
Finished weight, average	1,444	"
Total gain in 127 days	2,115	"
Average gain per steer	235	"
Daily gain for lot, 9 steers	16·65	"
Daily gain per steer	1·85	"
Gross cost of feed	$ 143 15	
Cost of 100 lbs. gain	6 76	
Cost of steers, 10,880 lbs. at $4 per 100 lbs.	435 20	
Total cost to produce beef	578 35	
Sold, 12,995 lbs. at $5 per 100 lbs., less 4 per cent.	623 80	
Profit on lot	45 45	

Net profit per steer	$ 5 05	
Average buying price per steer	48 35	
Average selling price per steer	69 30	
Average increase in value	20 95	
Average cost of feed for steer	15 90	
Amount of meal eaten by lot of 9 steers	4,937	lbs.
Amount of ensilage and roots	68,328	"
Amount of hay	7,092	"
Amount of straw eaten	252	"

Lot 'B'—Long Feed Steers.

Number of steers in lot	9	
First weight, gross, Nov. 12, 1904	9,380	lbs.
First weight, average	1,042	"
Finished weight, gross	12,720	"
Finished weight, average, June 2, 1905	1,413	" ....
Total gain in 202 days	3,340	"
Average gain per steer	371	"
Daily gain per steer	1·83	
Daily gain for lot, 9 steers	16·53	
Gross cost of feed	$ 246 74	
Cost of 100 lbs. gain	7 38	
Cost of steers, 9,380 lbs. at $4 per 100 lbs.	375 20	
Total cost to produce beef	621 94	
Sold, 12,720 lbs. at $6 per 100 lbs., less 4 per cent.	732 72	
Profit on lot	110 78	
Net profit per steer	12 31	
Average buying price per steer	41 69	
Average selling price per steer	81 49	
Average increase in value	39 80	
Average cost of feed for steer	27 41	
Amount of meal eaten by lot of 9 steers	10,356½	lbs.
Amount of ensilage and roots	91,558	"
Amount of hay	14,656	"
Amount of straw eaten	126	"

INFLUENCE OF AGE ON COST OF BEEF.

Cost of producing beef with three-year olds, two-year olds, yearlings and calves.

Since in connection with other work in steer feeding an opportunity occurred to give the influence of age on cost of beef production another trial, it was done, and reported on below in detail.

A study shows the following peculiarities revealed:—

Ages.	Daily Gain.	Cost 100 lbs. Gain.
	Lbs.	$ cts.
Three-year-olds	1·65	6 52
Two-year-olds	2·16	5 99
Yearlings	2·00	4 30
Skim milk calves, new born under 8 months	1·54	3 40

Lot 'C'—(Three-year Olds).

Number of steers in lot	9
First weight, gross	10,875 lbs.
First weight, average	1,208 "
Finished weight, gross	12,760 "
Finished weight, average	1,418 "
Total gain in 127 days	1,895 "
Average gain per steer	210 "
Daily gain for lot, 9 steers	14.88 "
Daily gain per steer	1.65 "
Gross cost of feed	$123 61
Cost of 100 lbs. gain	6 52
Cost of steers, 10,875 lbs. at 4c. per 100 lbs	434 00
Total cost to produce beef	557 61
Sold, 13,035 lbs. at $5 per 100 lbs., less 4 per cent	625 70
Profit on lot	68 09
Net profit per steer	7 55
Average buying price per steer	48 22
Average selling price per steer	69 52
Average increase in value	21 30
Average cost of feed for steer	13 73
Amount of meal eaten by lot of 9 steers	3,318 lbs.
Amount of ensilage and roots	67,536 "
Amount of hay	6,930 "
Amount of straw eaten	252 "

Lot 'D'—Two-year-olds.

Number of steers in lot	7
First weight, gross	7,490 lbs.
First weight, average	1,070 "
Finished weight, gross	9,415 "
Finished weight, average	1,345 "
Total gain in 127 days	1,925 "
Average gain per steer	275 "
Daily gain for lot, 7 steers	15·15 "
Daily gain per steer	2·16 "
Gross cost of feed	$ 109 51
Cost of 100 lbs. gain	5 99
Cost of steers, 7,490 lbs. at $4 per 100 lbs	299 60
Total cost to produce beef	409 11
Sold, 9,415 lbs. at $5 per 100 lbs., less 4 per cent	451 95
Profit on lot	42 84
Net profit per steer	6 12
Average buying price per steer	42 80
Average selling price per steer	64 76
Average increase in value	21 96
Average cost of feed for steer	15 64
Amount of meal eaten by lot of 7 steers	2,635 lbs.
Amount of ensilage and roots	50,116 "
Amount of hay	9,443 "

Lot 'E'—Steers over 8 Months Old.

Number of steers in lot	6
First weight, gross	2,900 lbs.

First weight, average	483	lbs.
Finished weight, gross	5,220	"
Finished weight, average	870	"
Total gain in 193 days	2,320	"
Average gain per steer	387	"
Daily gain for lot, 6 steers	12	"
Daily gain per steer	2	"
Gross cost of feed, Dec. 1, 1904, to June 12, 1905	$ 99 76	
Cost of 100 lbs. gain, Dec. 1, 1904, to June 12, 1905	4 30	
Average cost of feed for steer, Dec. 1, 1904, to June 12, 1905	16 63	
Amount of meal eaten by lot of 6 steers	4,682	lbs.
Amount of ensilage and roots	33,910	"
Amount of hay	5,388	"

Meal consumed consisted of: Oats, 1,509 lbs.; oil meal, 984 lbs.; bran, 1,785 lbs.; corn, 276 lbs.; shorts, 138 lbs.

Lot 'F'—Steers under 8 Months Old.

Number of steers in lot	5	
First weight, gross, May 12, 1905	795	lbs.
First weight, average	159	"
Finished weight, gross, Dec. 1, 1905	2,345	"
Finished weight, average	469	"
Total gain in 201 days	1,550	"
Average gain per steer	310	"
Daily gain for lot, 5 steers	7·71	"
Daily gain per steer	1·54	"
Gross cost of feed	$ 52 70	
Cost of 100 lbs. gain	3 40	
Average cost of feed for steer	10 54	
Amount of meal eaten by lot of 5 steers	2,210	lbs.
Amount of ensilage and roots	6,790	"
Amount of hay	2,055	"
Amount of skim milk	11,350	"

EXPERIMENTS WITH BABY BEEF.

The experiments to determine the cost of producing beef at an early age have been continued and are reported upon below.

BEEF FROM STEERS AT 2 YEARS OLD.

The first reports submitted in this line are those that have to do with calves dropped in April, 1903. These reports speak for themselves.

Lot 'G'—Limited Growing Ration Steers, Dropped in 1903.

Number of steers in lot	5	
First weight, gross, Dec. 1, 1904	3,690	lbs.
First weight, average	738	"
Finished weight, gross, June 26, 1905	5,200	"

Finished weight, average	1,040	lbs.
Total gain in 207 days	1,510	"
Average gain per steer	302	"
Daily gain for lot, 5 steers	7·20	"
Daily gain per steer	1·46	"
Gross cost of feed	$ 94 89	
Cost of 100 lbs. gain	6 28	
Average cost of feed per steer for 207 days	18 98	
Amount of meal eaten by lot of 5 steers	2,782	lbs.
Amount of ensilage and roots	45,139	"
Amount of hay	5,354	"
Amount of straw eaten	1,181	"

Meal consumed consisted of: Oats, 262 lbs.; corn, 840 lbs.; oil meal, 560 lbs.; bran, 350 lbs.; shorts, 455 lbs.; mixed crop, 315 lbs.

Lot 'H'—Full Faltening Ration, Dropped April, 1903.

Number of steers in lot	5	
First weight, gross, Dec. 1, 1904	4,950	lbs.
First weight, average	990	"
Finished weight, gross, Mar. 20, 1905	5,865	"
Finished weight, average	1,173	"
Total gain in 110 days	915	"
Average gain per steer	183	"
Daily gain for lot, 5 steers	8·30	"
Daily gain per steer	1·66	"
Gross cost of feed, Dec. 1, 1904 to Mar. 20, 1905	$ 66 64	
Cost of 100 lbs. gain	7 28	
Average cost of feed for steer	19 73	
Amount of meal eaten by lot of 5 steers	5,444	lbs.
Amount of ensilage and roots	36,973	"
Amount of hay	5,130	"
Amount of straw eaten	481	"

Meal consumed consisted of: Oats, 272 lbs.; oil meal, 1,648 lbs.; bran, 2,029 lbs.; shorts, 522 lbs.; mixed meal, 514 lbs.; corn, 459 lbs.

Lot 'I'—Full Fattening Ration, Dropped April, 1903.

Number of steers in lot	5	
First weight, gross, May 1, 1903	565	lbs.
First weight, average	113	"
Finished weight, gross	6,480	"
Finished weight, average	1,296	"
Total gain in 766 days	5,915	"
Average gain per steer	1,083	"
Daily gain for lot, 5 steers	7·72	"
Daily gain per steer	1·54	"
Gross cost of feed	$ 285 91	
Cost of 100 lbs. gain	4 83	
Cost of steers	25 00	
Total cost to produce beef $25 + $285.91	310 91	
Sold, 6,480 lbs. at $6 per 100 lbs., less 4 per cent	373 26	
Profit on lot	62 35	

Net profit per steer	$12 47	
Average buying price per steer	5 00	
Average selling price per steer	74 65	
Average increase in value	69 65	
Average cost of feed for steer	57 18	
Amount of meal eaten by lot of 5 steers	11,585	lbs.
Amount of ensilage and roots	81,805	"
Amount of hay	8,800	"
Amount of straw eaten	2,021	"
Amount of sugar beet pulp (dried)	378	"
Green feed (soiling crops)	9,408	"
Amount of skim milk	6,775	"
On pasture (lot)	1	Mo.

Meal consumed consisted of: Oats, 3,033 lbs.; bran, 3,416 lbs.; oil meal, 2,875 lbs.; shorts, 635 lbs.; gluten, 644 lbs.; corn, 459 lbs.; mixed meal (oats, pease, barley and wheat), 514 lbs.

Lot 'J'—Limited Growing Ration Steers, Dropped in 1903.

Number of steers in lot	5	
First weight, gross	500	lbs.
First weight, average	100	"
Finished weight, gross	5,200	"
Finished weight, average	1,040	"
Total gain in 786 days	4,700	"
Average gain per steer	940	"
Daily gain for lot, 5 steers	5·95	"
Daily gain per steer	1·19	"
Gross cost of feed	$ 205 17	
Cost of 100 lbs. gain	4 37	
Cost of steers	25 00	
Total cost to produce beef, $187.17 + $25	230 17	
Sold, 5,200 lbs. at $5.50 per 100 lbs., less 4 per cent	274 56	
Profit on lot	44 39	
Net profit per steer	8 89	
Average buying price per steer	5 00	
Average selling price per steer	54 91	
Average increase in value	49 91	
Average cost of feed for steer	37 43	
Amount of meal eaten by lot of 5 steers	5,122	lbs.
Amount of ensilage and roots	90,285	"
Amount of hay	8,931	"
Amount of straw eaten	2,371	
Pasture (50 cents per month)	30	Mos.
Soiling crop	15,430	lbs.

BEEF FROM STEERS AT 13½ MONTHS. STEERS DROPPED APRIL, 1904.

The heavily fed lot of the 2 lots put on experiment May 1, 1904, were in such good shape in June, 1905, that it was decided to sell them, as $5.50 per 100 lbs. live weight was offered. Reports follow. The beef from these steers was exceedingly tender, very fat, and of excellent flavour.

Lot 'K'—(Limited Growing Ration Steers; Dropped April, 1904).

Number of steers in lot	6	
First weight, gross	2,530	lbs.
First weight, average	422	"
Weight on going to grass, May 18, 1905	4,020	"
Average weight, May 18, 1905	670	"
Total gain in 169 days	1,490	"
Average gain per steer	248	"
Daily gain for lot, 6 steers	8.82	"
Daily gain per steer	1.47	"
Gross cost of feed, Dec. 1, 1904, to May 18, 1905	$58 66	
Cost of 100 lbs. gain	3 95	
Average cost of feed for steer	9 77	
Amount of meal eaten by lot of 6 steers	1,478	lbs.
Amount of ensilage and roots	32,040	"
Amount of hay	2,574	"
Amount of straw eaten	1,684	"

Meal consumed consisted of: Oats, 467 lbs.; oil meal, 408 lbs.; bran, 603 lbs.

Lot 'L.'—Full Fattening Ration Steers, Dropped April, 1904.

Number of steers in lot	6	
First weight, gross, Dec., 1904	2,900	lbs.
First weight, average	483	"
Finished weight, gross	5,220	"
Finished weight, average	870	"
Total gain in 193 days	2,320	"
Average gain per steer	387	"
Daily gain for lot, 6 steers	12	"
Daily gain per steer	2	"
Gross cost of feed, Dec. 1, 1904, to June 12, 1905	$99 76	
Cost of 100 lbs. gain, Dec. 1, 1904, to June 12, 1905	4 30	
Average cost of feed for steer, Dec. 1, 1904, to June 12, 1905	16 63	
Amount of meal eaten by lot of 6 steers	4,682	lbs.
Amount of ensilage and roots	33,910	"
Amount of hay	5,388	"

Amount of meal consumed consisted of: Oats, 1,509 lbs.; oil meal, 974 lbs.; bran, 1,785 lbs.; corn, 276 lbs.; shorts, 138 lbs.

Lot 'M'—Full Fattening Ration Steers, Dropped April, 1904.

Number of steers in lot	6	
First weight, gross, May 1, 1904	740	lbs.
First weight, average	123	"
Finished weight, gross	5,220	"
Finished weight, average	870	"
Total gain in 407 days	4,480	"
Average gain per steer	746	"
Daily gain for lot, 6 steers	11·00	"
Daily gain per steer	1·83	"
Gross cost of feed, Dec. 1, 1904, to June 12, 1905	$ 99 76	

Cost of 100 lbs. gain, Dec. 1, 1904, to June 12, 1905	$4 30
Cost of steers up to Dec 1, 1904—Feed, $59.83; buying price, $30	89 83
Cost of 100 lbs. gain—May 1, 1904, to Nov. 30, 1904	2 77
Total cost of steers at 407 days or 13½ months old	189 59
Sold, 5,220 lbs. at $5.50 per 100 lbs., less 4 per cent	275 66
Profit on lot	86 07
Net profit per steer	14 34
Average value of steer at birth	5 00
Average selling price per steer	45 94
Average increase in value, allowing $5 as value of calf when dropped	40 94
Average cost of feed for steer	26 59
Amount of meal eaten by lot of 6 steers in 407 days	6,707 lbs.
Amount of ensilage and roots	43,150 "
Amout of hay	6,900 "
Amount of green feed, clover, mixed crop cut green, rape, &c	9,408 "

Meal consumed consisted of: Oats, 2,289 lbs.; oil meal, 1,145 lbs.; bran, 2,523 lbs.; corn, 276 lbs.; shorts, 138 lbs.; barley meal, 336 lbs.

Lot 'N'—Limited Growing Ration Steers, Dropped April, 1904.

Number of steers in lot	6
First weight, gross	490 lbs.
First weight, average	81 "
Total weight, May 18, 1905	4,020 "
Average weight, May 18, 1905	670 "
Total gain in 383 days	3,530 "
Average gain per steer	588 "
Daily gain for lot, 6 steers	9·18 "
Daily gain per steer	1·53 "
Gross cost of feed, Dec. 1, 1904, to May 18, 1905	$ 58 66
Cost of 100 lbs. gain, Dec. 1, 1904, to May 18, 1905	3 95
Cost of steers up to Dec. 1, 1904—Feed, $57.90; buying price, $30	87 90
Cost of 100 lbs. gain, May 1, 1904, to Nov. 30, 1904	2 83
Total cost of steers at 383 days or 12⅔ mos. old	146 56
Value of steers May 18, 1905, going on grass 4,020 lbs. at 3½	140 70
Loss on lot	5 86
Net loss per steer	0 97
Average buying price per steer	5 00
Average value of steer at 12⅔ mos. old	23 45
Average increase in value, allowing $5 value of calf when dropped	18 45
Average cost of feed for steer	19 43
Amount of meal eaten by lot of 6 steers	3,356 lbs.
Amount of ensilage and roots	42,882 "
Amount of hay	4,173 "
Amount of straw eaten	1,684 "
Amount of green feed, clover, mixed crop cut green, rape, &c	7,266 "

Meal consumed consisted of: Oats, 1,247 lbs.; oil meal, 504 lbs.; barley, 273 lbs.; bran, 1,332 lbs.

CALVES DROPPED APRIL, 1905.

These lots have not done quite so well as those dropped in 1904, but will, it is evident make excellent animals when 6 months older.

Lot 'O'—Limited Growing Ration, Dropped 1905.

Number of steers in lot	5
First weight, gross, May 12, 1905	490 lbs.
First weight, average	98 "
Finished weight, gross, Dec. 1, 1905	1,800 "
Finished weight, average	360 "
Total gain in 201 days	1,310 "
Average gain per steer	262 "
Daily gain for lot, 5 steers	6·53 "
Daily gain per steer	1·30 "
Gross cost of feed	$ 46 97
Cost of 100 lbs. gain	3 58
Average cost of feed for steer	9 39
Amount of meal eaten by lot of 5 steers	2,050 lbs.
Amount of ensilage and roots	5,720 "
Amount of hay	1,582 "
Amount of skim milk	10,825 "

Meal consumed consisted of: Oats, 733 lbs.; bran, 907 lbs.; barley, 228 lbs.; Gluten, 182 lbs.

Lot 'P'—Full Fattening Ration, Dropped 1905.

Number of steers in lot	5
First weight, gross, May 12, 1905	795 lbs.
First weight, average	159 "
Finished weight, gross, Dec. 1, 1905	2,345 "
Finished weight, average	469 "
Total gain in 201 days	1,550 "
Average gain per steer	310 "
Daily gain for lot, 5 steers	7·71 "
Daily gain per steer	1·54 "
Gross cost of feed	$ 52 70
Cost of 100 lbs. gain	3 40
Average cost of feed for steer	10 54
Amount of meal eaten by lot of 5 steers	2,210 "
Amount of ensilage and roots	6,790 "
Amount of hay	2,055 "
Amount of skim milk	11,350 "

Meal consumed consisted of: Oats, 840¾ lbs.; bran, 960 lbs.; and barley, 175 lbs.

SWINE FEEDING.

I have to report a rather unsuccessful year with swine. The rather poor showing made is due to various causes chief among them being the frequent change of men. The regular feeder was called away several times for considerable periods and it was not

always possible to replace him with a man who could do the work satisfactorily, and very considerable losses were suffered.

The experiment with the small pig farm is being continued and will be reported upon more fully at a later date. A report of the crops grown on this area will be found on page 84.

EXPERIMENTS.

A number of swine are constantly being fed in an experimental way. The work done this year was along the lines of (1) economy of production, (2) type of pig as influenced by feed and environment or conditions under which they were fed.

Five lots of 5 pigs each were fed as follows:—

Lot 1. Meal, Alfalfa pasture.

Lot 2. Meal, clover pasture.

Lot 3. Meal, root pasture.

Lot 4. Meal *no* supplementary food in pens.

Lot 5. Meal, roots fed in pens.

Reports of the different lots follow. All pigs were fed on the same meal mixture shorts, 500 lbs.; oil meal, 30 lbs.; gluten, 10 lbs.

Lot 1—Alfalfa Pasture.

No. of pigs in lot	5
Weight to start Sept. 10, 1905	529 lbs.
Average weight to start	106 "
Weight to finish Oct. 15, 1905	775 "
Average weight to finish	155 "
Total gain in 35 days	246 "
Average gain per pig in period of 35 days	49 "
Daily rate of gain	1:4 "
Food consumed in addition to pasture, meal	1,002 "
Cost of food	$ 9 02
Cost of 100 lbs. gain	3 67

The pigs had about ¼ acre of alfalfa.
Good effect on form and health of animals.

Lot 2—Red Clover Pasture.

No. of pigs in lot	5
Weight to start, Sept. 10, 1905	455 lbs.
Average weight to start	91 "
Weight to finish Oct. 15, 1905	716 "
Average weight to finish	143 "
Average gain per pig in 35 days	52 "
Total gain in 35 days	259 "
Daily rate of gain	1·5 "
Food consumed in addition to pasture, meal	1,012 "
Value of food apart from pasture	$9 10
Cost of 100 lbs. gain, pasture neglected	3 52

The pigs had about ¼ acre of clover.
Good effect on form and health of animals.

Lot 3—Root Pasture.

Mangels, sugar mangels, sugar beets, carrots and turnips.

No. of pigs in lot	5
Weight to start Sept. 10, 1905	509 lbs.
Average weight to start	102 "
Weight to finish Oct. 15, 1905	745 "
Average weight to finish	149 "
Total gain in 35 days	236 "
Average gain per pig in 35 days	47 "
Daily rate of gain	1.31 "
Food consumed in addition to pasture	1,002 "
Value of food apart from pasture	$9 02
Cost of 100 lbs. gain, pasture neglected	3 82

Pigs ate roots of all kinds but turnips quite greedily, following them down quite deep into the ground in the case of sugar beets and carrots. In the 35 days they ate the roots off an area of 77 feet long and 40 feet wide. This system of feeding has a tendency to develop the paunch and must be used with caution.

Lot 4—No Pasture—(Fed in Pens).

No. of pigs in lot	5
Weight to start Sept. 10, 1905	248 lbs.
Average weight to start	50 "
Weight to finish Oct. 15, 1905	501 "
Average weight to finish	100 "
Total gain in 35 days	253 "
Average gain per pig	50⅗ "
Daily rate of gain	1.45 "
Food consumed, meal	1,202 "
Value of food	$10 81
Cost of 100 lbs. gain	4 23

This method of feeding seemed to have a tendency to make rather short flabby pigs.

Lot 5—Roots and Meal (Fed inside).

No. of pigs in lot	5
Weight to start Sept. 10, 1905	262 lbs.
Average weight to start	52 "
Weight to finish Oct. 15, 1905	570 "
Average weight to finish	114 "
Total gain in 35 days	308 "
Average gain per pig	61⅗ "
Daily rate of gain	1·77 "
Amount of meal consumed	1,002 "
Value of meal	$ 9 02
Cost of 100 lbs. gain meal alone	2 93
Roots consumed	483 lbs.
Value of roots	0·49
Total cost to produce pork	$ 10 51
Cost 100 lbs. gain meal and roots	3 09

This method of feeding had a good effect on the form of the animals making them come as near the ideal bacon type as could be desired.

PASTURING PIGS ON RIPE PEAS.

An acre of peas on the hog rotation were allowed to ripen and pigs turned out to pasture on them. The returns in pork were not satisfactory but the effect of the exer-

cise and the pease together was wonderfully beneficial so far as form of pigs was concerned and so far as fitting them for finishing off for the packer when brought into the pens.

UTILIZATION OF FEED.

An examination into the supply of feed produced on the '200 acre Farm,' the experimental plots of roots and corn, and the meal or grain purchased for use in the barns, together with a detailed statement of the disposal thereof, and a statement of the kinds of grain and meal consumed from July 1, 1904 to June 30, 1905, follows:—

SUMMARY of Feed of all kinds used for Stock on 200 acre Farm from July 1, 1904 to June 30, 1905.

——	Straw.	Grain or Meal.	Roots and Ensilage.	Hay.
	lbs.	lbs.	lbs.	lbs.
Grown on 200 acre farm, crop of 1904	168,635	92,197	1,364,030	376,387
Received from Cereal Division	10,000	9,519	307,384	.....
Received from Distribution Division (small grain)	.....	8,671	.....	.....
Purchased	130,655	383,709	.....	22,330
Total supplied during year	309,290	494,096	1,671,414	398,717
Consumed during year	294,511	435,559	1,116,123	342,471
On hand June 30, 1905	4,000	58,537	100,000	5,000

DISPOSITION of Feed harvested on, and bought for use of Live Stock on 200 Acre Farm.

——	Hay.	Grain and Meal.	Corn and Roots.	Straw.
	lbs.	lbs.	lbs.	lbs.
19 Horses	138,700	126,841	20,500	36,500
73 Steers	79,721	59,185	358,356	95,743
44 Milch cows	46,755	66,343	375,884	46,153
48 Young stock and bulls	37,702	36,554	298,981	50,921
70 Sheep	19,458	9,458	12,000	11,650
200 Swine	.....	129,135	15,905	40,500
Supplied to Poultry division	.....	24,792	5,827	13,044
" " Veterinary laboratory	1,535	3,551	3,670	.....
Loss by experimental curing	18,600	.....	25,000	.....
Total accounted for	342,471	435,559	1,116,123	294,511
Amount harvested and received	398,717	494,096	1,671,414	309,290
On hand June 30, 1905	5,000	58,537	100,000	4,000
Shrinkage or loss	51,246	.....	455,291	10,779

The meal consumed consisted of:—

	Lbs.
Oats	171,936
Barley	19,363
Bran	96,600
Shorts	65,000
Oil meal	35,100
Various feeds	47,560
Total	435,559

LIVE STOCK INVENTORIES.

	July 1, 1904.		June 30, 1905.				Gross Returns, made up of increase in value, value of products and value of animals sold.
	Number on hand.	Value.	Number handled during year.	Number on hand.	Value.	Returns of all descriptions.	
		$ cts.			$ cts.	$ cts.	$ cts.
Horses	19			19		3,458 40	3,458 40
Shorthorns—							
Pure breds (17) and grades (4).	18	3,495 00	25	21	4,510 00	956 43	1,971 43
Guernseys—							
Pure breds (15) and grades (6).	23	2,040 00	23	21	2,530 00	898 67	1,388 67
Ayrshires—							
Pure breds (20) and grades (5).	28	2,560 00	29	25	2,800 00	918 66	1,158 66
Canadians—							
Pure breds (10) and grades (4).	10	1,075 00	15	14	1,650 00	445 09	1,020 09
Steers	22	440 00	73	16	300 00	1,787 90	1,647 90
Sheep	66	1,020 00	70	49	1,170 00	115 08	265 08
Swine		2,090 00	200	117	2,255 00	1,316 07	1,481 07
Total		12,720 00	454	282	15,215 00	9,896 30	12,391 30

SUMMARY OF LIVE STOCK OPERATIONS.

RETURNS.

Gross returns from animals of all classes, including value of products, values of services and increase in value of young stock	$12,391 30
Manure, 1,200 tons	1,200 00
Total	$13,591 30

EXPENDITURE.

Value of Food Consumed.

Meal		$4,355 59
Hay		1,198 86
Roots and ensilage		1,116 12
Whole milk, 18,000 lbs		180 00
Skim-milk, 200,000 lbs		300 00
Straw, 147 tons at $4 per ton		588 00
Cost of labour in connection with care of horses, cattle, sheep and swine:—		
Herdsman	$ 700 00	
Two men at $450	1,080 00	
Three men at $504	1,512 00	
Extra help, teaming, &c.	415 02	
	$3,707 02	
		3,707 02
		$11,445 59
Balance		2,145 71

SUMMARY OF FARMING AND LIVE STOCK OPERATIONS ON '200-ACRE FARM,' 1905.

RETURNS.

Total value of return from fields	$ 5,590 08	
Total value of returns from live stock	13,591 30	
Total returns	$19,181 38	
		$19,181 38

EXPENDITURE.

Total cost of field operations (see page 90)	$ 3,858 18	
Total cost of live stock operations (see page 74)	11,445 59	
Total expenditure	$15,303 77	
		$15,303 77
Balance		3,877 61

CROPS.

I have to report a fairly successful year for all kinds of crops grown. The season was peculiarly favourable for hay and pasture. It was, however, rather difficult to cure the hay properly hence the quality is not quite so good as might be desired. The kinds of hay grown this year were timothy, mixed timothy and red clover, red clover and alfalfa, red clover and orchard grass. The red clover fields and the field of alfalfa and orchard grass were cut twice. Some of the fields of red clover gave about 5½ tons per acre of cured hay in two cuttings. The pasture, a field of 14 acres, was able to carry an equivalent of 30 cows for five months. During about half that period they were being fed some green feed or ensilage as well as a small meal ration, in addition to the pasture.

The only cereal sown was oats. The variety grown was the Banner. Where soil conditions were favourable the returns were fairly good, some fields going as high as 66⅔ bushels per acre. The quality was for the most part very good. The crop of straw was rather heavy in comparison with the grain, due to the rather damp season.

On the black muck areas weeds came so thickly as to necessitate cutting certain parts while yet green. The mixture of grass, oats and weeds so cut was fed to the cattle. This of course had the effect of lowering average yield per acre as the crop-less areas had to be counted in when estimating average yields per acre.

The grass, clover and alfalfa seeds sown on the different fields came up well, and did exceedingly well all summer and till late in the fall, making a fine promise for good crops of hay next year.

Corn was a very heavy crop this year. Some fields yielded an average of over 20 tons per acre, although about 20 per cent of the crop was a small growing variety, Longfellow.

The varieties grown were Longfellow, Selected Leaming, and Early Mastodon. Longfellow was almost ripe when cut about September 20, Selected Leaming was glazing or in the dough stage, and the Early Mastodon was in about the same condition. The average yield from 40 acres was about 18 tons per acre, large and small varieties all taken together. The quality of the ensilage produced is very excellent, showing a very high percentage of dry matter. One sample taken from silage made from Early Mastodon was found by Mr. Shutt, our chemist, to contain about 26 per cent of dry matter. The silage from the Selected Leaming and Longfellow is no doubt even richer in food content.

As will be seen by a glance at the reports below the cost to produce the crops was very high per acre. On account of the high yield, however, the cost per ton in the silo is comparatively low.

Mangels, sugar mangels, sugar beets, carrots, swedes, white turnips, yellow Aberdeens, kohl rabi, cabbage, 1,000 headed kale and rape were all grown in greater or lesser quantities.

On account of the wet season the cost to grow an acre of roots was very great. The yield was high, however, so the cost of roots per ton was not unusually high.

Mangels are found to be the most satisfactory root to grow on this land. Sugar mangels, while not yielding as good a crop per acre, supply a peculiarly good feed for cattle and are grown in moderate quantities for that reason. Sugar beets yielded very well this year. They are particularly valuable as feed for swine. Kohl rabi are very welcome to sheep. The 1,000 headed kale is also relished by sheep, and is probably superior to rape as a fall feed. Cabbages were fed to sheep.

COMPARATIVE Statement of Crops on '200 Acre Farm,' from 1899 to 1905, inclusive. (200 Acre Farm includes 7 Acres of Roads.)

YEAR.	GRAIN.		HAY.		ROOTS AND CORN.		PASTURE.		SOILING CROP.		PIG PASTURE.		Remarks.
	Area in Acres.	Yield in Pounds.	Area in Acres.	Yield in Tons.	Area in Acres.	Yield in Tons.	Area in Acres.	Number of Cattle.	Area in Acres.	Disposition of Crops.	Area in Acres.	Crops Grown for Pasture.	
1899.....	73	118,466	39	93	40	326½	40	36	1	Fed to dairy cows	....	. . ..	Generally considered a good year for all crops.
1900.....	80	126,621	53	138	40	743	20 and aftermath.	49	....	. .. .	....	.....	Season very favourable for most crops.
1901.....	79	114,472	58	210	40	702	16 and aftermath.	52	....	....	....	.....	" " "
1902.....	74	144,914	60	216	39	665	20 and aftermath.	62	....	....	5	Clover, rape and aftermath.	Season favourable for hay, bad for corn.
1903.....	69	126,619	62	154	34	473	16 and aftermath.	96	5	Dairy cows, bulls and calves.	6	Clover and rape.	Season very unfavourable for most crops, particularly adverse to corn and roots. No second crop hay.
1904.....	67	112,009	60	192	46¾	674	13·75	98	3	" " ..	3	" " ..	Season unfavourable for grain and corn, good for hay and roots.
1905.....	66	111,932	59	258	47	971½	14 and aftermath.	100	5	All cattle ensilage fed.	4	Clover, rape, mixed crop, pease, roots.	Season favourable for hay, corn and roots, too wet for grain on mucky land.

Of the area indicated as having been used as pasture for swine in 1905, 2 acres yielded a crop of green feed for soiling cattle before being given over to swine. Cattle were pastured on roads where possible. A small rough field not included in the '200 Acre Farm' was used as partial pasture and a run for about 20 head of young stock. These cattle received ensilage or other succulent food every day, and meal at the rate of about 1½ lbs. each per day part of the time.

The variety of crops grown and the varying areas under each crop each year make it quite difficult to make a comparison of the returns of the different years, so to simplify matters I would suggest that a fixed valuation be put upon the products, and the returns of each year valued accordingly.

Fixing prices as follows: Grain, $1 per hundred lbs.; roots and ensilage $2 per ton; hay $7 per ton; summering cattle, $8 per season; and an area used as pasture for pigs, $15 per acre; the returns from the '200-acre farm' for the years mentioned may be said to have been worth $2,776.66 in 1899; $4,110.21 in 1900; $4,434.72 in 1901; $4,787.14 in 1902; $4,148.19 in 1903; $4,741.09 in 1904; $5,714.32 in 1905.

ROTATION EXPERIMENT.

The experiment to determine the effects of different rotations is being followed up and over the detailed report of the labour on each plot, and the returns therefrom will be found some brief notes on each field and on the rotation as a whole.

The rotations are as follows:—

Rotation A.—Five years, clover hay, Timothy hay, grain, corn, grain.

Rotation B.—Five years, clover hay, grain, clover hay, corn, grain.

Rotation E.—Three years, pasture, corn, grain.

Rotation Z.—Three years, clover hay, corn, grain.

Rotation S.—Four years, shallow ploughing, clover hay, timothy hay, roots, grain.

Rotation D.—Four years, deep ploughing, clover hay, timothy hay, roots, grain.

Rotation H.—Three years, hog pasture, roots, grain or soiling crop.

Rotation T.—Four years, sheep pasture, roots and soiling crop, grain, clover hay.

Rotation M.—Six years, grain, grain, clover hay, timothy hay for three years.

Rotation N.—Six years, grain, grain, timothy hay for four years.

Rotation O.—Three years, grain, timothy hay, timothy hay.

Rotation P.—Three years, grain, clover hay, timothy hay.

In the descriptions of the rotations and fields that follow, an effort is made to give as concisely as possible the location of each field, its size, the character of its soil, its drainage and its general crop history.

In the tables will be found all items of expenditure. The manure is applied in the same ratio to each field in each rotation. To illustrate: if to the corn land in rotation 'Z,' 15 tons of manure per acre are applied; this equivalent to 5 tons per acre per annum, as Z, is a three-year rotation. Then in applying manure to M, 30 tons per acre would be applied, as M is a six-year rotation. Since the manure must vary slightly in quantity each year, $3 per annum per acre is charged in each rotation.

COMPARATIVE VALUES OF ROTATION ON STOCK FARMS.

Supposing the average animal of the bovine species to consume 2,000 lbs. hay, 1,500 lbs. meal, 16,000 lbs. roots and ensilage and 2,000 lbs. of straw per annum, which valued at prices given above would amount to $37, a rough idea of the relative value of the different rotations for stockmen may be arrived at.

ROTATION

Lot.	Location.	Description f soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.					
		p. c,	p. c.	p. c.	p. c.	p. c.	p c.	p. c.	Ac.	1904.	1905.	$ cts.	$ cts
A 1	W.S. 3	30	45	...	....	25	....	....	9·96	Hay	Oats	59 76	16 89
A 2	L.S. 1	30	65	5	....	..	....	....	8·90	"	Hay	53 40	11 57
A 3	A.S. 14	10	15	20	20	15	....	20	10·20	Oats	Corn	61 20	16 87
A 4	W.P.G.S. 1 / F.S. 1	70	20	10	....	...	....	...	9·15	"	Hay	54 90	11 89
A 5	F.S. 3	....	35	30	10	15	10	....	9·63	Corn	Oats	57 78	15 76
	Aggregate								47·84			287 04	72 98
	Average per acre in 1905								1			6 00	1 52

ROTATION

B 1	W.S. 4	5	35	5	50	5	....	....	10 00	Corn	Oats	60 00	16 90
B 2,	L.S. 2	20	70	....	5	5	..	....	8 82	Hay	"	52 92	14 97
B 3	A.S. 15	20	60	5	....	15	....	....	10 20	Oats	Hay	61 20	13 26
B 4	W.P.G.S. 2	20	60	15	....	5	....	...	9 15	"	"	54 90	11 89
B 5	F.S. 2	..	30	30	40	....	....	...	9 93	Hay	Corn	59 58	14 73
	Aggregate								48 10			288 60	71 75
	Average per acre in 1905								1			6 00	1 49

ROTATION 'A.'

This rotation of 5 years duration includes grain, hay (2 years) grain and corn or roots in the order named. The grain crop mentioned first comes after corn. With the first crop of grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy per acre. The field is left in hay for 2 years, then in August of the second year it is ploughed and cultivated at intervals till October, when it is ridged up and left till the next spring. Oats are sown on this field, and with them red clover seed at the rate of 10 lbs. per acre. This clover is allowed to grow for something over a year or until corn seeding time the following spring, when it is turned under with a shallow furrow along with the manure that will have been applied during the winter. After the corn has been harvested the land is ploughed shallow and left till the next spring.

The crops on this rotation this year have been fairly satisfactory. On A1 the ploughing in the fall was delayed, hence a light crop of grain. On A2 two crops of Alfalfa hay were harvested in time to permit of August ploughing. A3 gave an excellent crop of corn, and A4 a very good crop of hay. On A5 the black muck portion was injuriously affected by the weather, and no crop was harvested therefrom.

'A.'

Items of Expense in Raising Crop of 1905.						Particulars of Crop of 1905.								
Manual Labour.	Horse Labour.													
No. of hours.	Cost of Manual Labour.	No. of hours with Team.	No. of hours with Single Horse.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per acre.	Profit per acre in 1905.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
44	6 60	166¾	....	50 02	7 29	140 56	14 11	12,155	25,181	.....	.....	171 51	17 22	3 11
158	23 70	52	49	25 40	.....	114 07	12 81	.....	. ...	62,650	.....	250 60	28 16	15 35
605	90 75	339	....	101 70	.....	270 52	26 52	.....	.. .	.....	399,915	399 91	39 20	12 68
180	27 00	72	38	29 20	. ..	122 99	13 44	... .	.....	70,628	.....	247 20	27 02	13 58
87	13 05	144	10	45 20	....	131 79	14 74	16,969	23,281	... .. .	.....	216 25	22 45	7 71
1,074	161 10	773¾	97	251 52	7 29	779 93	16 30	29,124	48,462	133,278	399,915	1,285 47	26 86	10 56
22·44	3 36	16·17	2·02	5 25	0 15	16 30	16 30	608	971	2,785	8,359	26 86	26 86	10 56

'B.'

78	11 70	161	5	49 30	6 44	144 34	14 43	10,725	32,125	.....	20,000	191 50	19 15	4 72
82	12 30	140	6	43 20	8 42	131 81	14 94	14,040	19,910	....	.....	180 22	20 43	5 49
310	46 50	100	42	38 40	.....	159 36	15 62	.....	.....	92,240	.....	322 84	31 65	16 03
227	34 05	80	38	31 60	.....	132 44	14 47	..	.....	93,682	.....	327 88	35 83	21 36
760	114 00	359	....	107 70	. ...	296 01	29 81	.....	. ....	.....	411,850	411 85	41 47	11 66
1,457	218 55	840	91	270 20	14 86	863 96	17 96	24,765	52,035	185,922	431,850	1,434 29	29 81	11 85
30·29	4 54	17·46	1·89	5 63	·30	17 96	17 96	515	1,081	3,865	8,978	29 81	29 81	11 85

ROTATION 'B.'

This rotation of 5 years duration includes grain, hay, corn or roots in the order named, the first crop of grain following a crop of corn or roots. Red clover 10 lbs., alsike 1 lb. and timothy 5 lbs. is sown with the grain each time grain is sown. When grain follows hay the land is ploughed in the early fall. When corn follows hay the land is ploughed in the spring, the spring growth of grass and clover being ploughed in along with the manure which will have been applied during the preceding winter.

The crops on this rotation were very fair. The crop on B1 however was very short on account of the black muck soil being very weedy. It was necessary to cut part of this field while still green so that the average was very materially lowered. B2 was similarly affected in a less degree. The corn on B5 was a remarkable crop.

ROTATION

Four year rotation, with Deep

Lot,	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed and twine and use of machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1904.	1905.	$ cts.	$ cts.
D 1	E. G. P. S. 2	20	80	....	....	....	....	....	2	Oats	Hay	12 00	1 60
D 2	E. G. P. S. 4	20	80	....	....	....	....	....	2	Oat hay	"	12 00	1 60
D 3	E. G. P. S. 6	30	70	....	....	....	....	....	2	"	Roots	12 00	2 60
D 4	E. G. P. S. 8	60	40	....	....	....	....	....	2	Roots	Oats	12 00	3 38
	Aggregate								8			48 00	9 18
	Average per acre in 1905								1			6 00	1 14

ROTATON

Four year rotation, with Shallow

S 1	E. G. P. S. 1	20	80	....	....	....	....	....	2	Oats	Hay	12 00	1 60
S 2	E. G. P. S. 3	20	80	....	....	....	....	....	2	Oat hay	"	12 00	1 60
S 3	E. G. P. S. 5	30	70	....	....	....	....	....	2	"	Roots	12 00	2 60
S 4	E. G. P. S. 7	60	40	....	....	....	....	....	2	Roots	Oats	12 00	3 38
	Aggregate								8			48 00	9 18
	Average per acre in 1905								1			6 00	1 15

ROTATION 'D.'

Deep Ploughing.

This rotation is of 4 years duration and includes grain 2 years, hay and roots.

The grain crop follows roots, the root land being ploughed to a depth of about 7 inches after the roots are harvested in the fall. With the grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field, that is it is not pastured off as is usually done. In the second hay year two crops are cut if possible, and the land ploughed in August with a deep 7-inch furrow.

D1 and D2. These two plots were under hay this year. Since they had not been treated differently from S1 and S2 before being seeded down they were not cut separately.

D3. This plot, like its fellow S3, was under roots. The seed came up badly and it was necessary to resow with turnips. The cut worm then attacked the plots so that it was not considered advisable to give the actual crops in the report found below. The figures given are the average of the crops grown on both D3 and S3.

D4. This plot was under oats. The crops in this case were kept separate although there had been no difference in methods of cultivation previous to seeding to oats.

D.'

late Fall Plowing Area 8 acres.

Items of Expense in raising Crop of 1905.								Particulars of Crop of 1905.						
Manual Labour.		Horse Labour.												
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1905.
	$ cts.			$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
50	7 50	16½	10½	7 05	.....	28 15	14 08	.....	....	19,601	.....	68 60	34 30	20 22
50	7 50	16½	10½	7 05	.....	28 15	14 07	.....	.....	19,601	.....	68 60	34 30	20 22
425	63 75	50¼	28	20 67	.....	99 02	49 51	.....	.....	.....	109,086	109 09	54 50	5 04
19	2 85	24½	....	7 35	2 22	27 80	13 90	3,705	5,885	.....	.....	48 82	24 41	10 51
544	81 60	107¾	49	42 12	2 22	183 12	91 56	3,705	5,885	39,202	109,086	295 11	147 55	55 99
68	10 20	13⅓	6⅛	5 26	0 28	22 89	22 89	463	735	4,900	13,636	36 89	36 89	14 00

'S.'

early Fall Plowing Area 8 acres.

50	7 50	16½	10½	7 05	....	28 15	14 08	.....	....	19,601	.....	68 60	34 30	20 22
50	7 50	16½	10½	7 05	.....	28 15	14 07	.....	.....	19,601	.....	68 60	34 30	20 22
425	63 75	50¼	28	20 67	.....	99 02	49 51	.....	.....	.....	109,086	109 09	54 54	5 03
19	2 85	24½	....	7 35	2 11	27 69	13 84	3,510	6,270	.....	.....	47 64	23 82	10 02
544	81 60	107¾	49	42 12	2 11	183 01	91 50	3,510	6,270	39,202	109,086	293 93	146 96	55 49
68	10 20	13⅓	6⅛	5 26	0 26	22 88	22 88	439	784	4,900	13,635	36 74	36 74	13 86

ROTATION 'S.'

Shallow Ploughing.

This rotation is of 4 years duration and includes grain, 2 years hay and roots.

The grain crop follows roots, the root land being ploughed (or cultivated) to a depth of about 4 inches after the roots are harvested in the fall. With the grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field, that is, it is not pastured off as is usually done. In the second hay year two crops are cut if possible and the land ploughed in August with a shallow 4-inch furrow. If manure is applied before ploughing a sub-soiler should be attached to the plough to loosen up the sub-soil to a depth of 8 or 9 inches. If manure is not applied this end is attained by means of a strong deep-cutting cultivator after the sod has rotted in the fall, or next spring.

S1 and S2. These two plots were under hay this year. Since they had not been treated differently from D1 and D2 before being seeded down they were not cut separately.

S3. This plot, like its fellow D3, was under roots. The seed came up badly, and it was necessary to resow with turnips. The cut worm then attacked the plots so that it was not considered advisable to give the actual crops in the report found below. The figures given are the average of the crops grown on both S3 and D3.

S4. This plot was under oats. The crops in this case were kept separate, although there had been no difference in methods of cultivation previous to seeding to oats.

ROTATION

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.	Rent and manure.	Seed, twine and use of machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1904.	1905.	$ cts.	$ cts.
E 1	W.S. 1	40	40	....	....	15	5	....	14·00	.....	.....	84·00	23·66
E 2	L.S. 4	10	60	10	....	20	....	....	13·75	.....	.....	82·50	20·51
E 3	Morn.	30	60	5	....	5	....	....	14·00	.....	.....	84·00	25·57
	Aggregate								41·75	.....	.....	250 50	69·74
	Average per acre in 1905								1·00	.....	.....	6·00	1·67

ROTATION

Z 1	W.S. 2.	40	40	....	....	15	5	....	6·00	.....	.....	36·00	10·14
Z 2	L.S. 3.	10	60	10	....	20	....	....	5·81	.....	.....	34·86	8·73
Z 3	Obs. S.	10	60	20	10	....	....	....	5·50	.....	.....	40·00	7·15
	Aggregate								17·31	.....	.....	110·86	26·02
	Average per acre in 1905								1·00	.....	.....	6·00	1·59

ROTATION 'E.'

This rotation of three years' duration includes grain, pasture and corn.

The grain comes after the corn, the stubble of which is treated as described under rotation 'A.' With the grain in the spring is sown 10 lbs. red clover, 1 lb. alsike clover, 5 lbs. alfalfa and 5 lbs. timothy seed per acre. If weather permits the field is pastured slightly in the fall.

After the grain crop the land is pastured, the grass seeding having been done with this object in view. In estimating the value of the returns from this field, pasture is charged at $1 per month per cow. At this rate the returns fall very far short of what would have been the returns if a hay crop had been harvested, if we may judge by the returns from 'Z 2.' This rotation and rotation Z were introduced into the list in order to gain some idea as to the difference in returns probable from land pastured and land from which all the crops are harvested. Of course the corn crop after the pasture has in a measure made up for the difference in favour of the no pasture rotation 'Z,' but the returns are on the whole still considerably short of those from 'Z.'

Corn follows the pasture. Manure is applied during the fall and winter and turned under with the growth of clover grass in the spring.

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'E.'

Items of Expenses in Raising Crop in 1905.								Particulars of Crop in 1905.						
Mannal Labour.	Horse Labour.													
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1905.
Hrs.	$ cts.	Hrs.	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
135	20 25	200	12	62 40	18 96	209 27	14 94	31,580	36,770	.....	.....	399 34	28 52	13 58
843	126 45	452	20	139 60	.....	369 06	26 84	.....	.....	.....	530,340	530 34	38 57	11 73
.....	.....	.....	....	.....	.....	109 57	7 83	....	....	*162 m.	.....	162 00	11 57	3 74
978	146 70	652	32	202 00	18 96	687 90	.....	31,580	36,770	162	530,340	1,091 68	....	.....
23 42	3 51	15·61	76	4 83	0 45	16 47	16 47	756	880	3·88	12,678	26 14	26 14	9 67

'Z.'

60	9 00	71	4	22 10	5 07	82 31	12 05	8,450	14,930	.....	.....	115 36	19 23	7 18
325	48 75	181	15	57 30	.....	149 64	25 75	.....	.....	.....	195,850	195 85	33 71	7 96
93	14 40	55	36	23 70	....	85 25	15 50	.....	.....	59,260	.....	207 41	37 71	24 63
481	72 15	307	55	103 10	5 07	317 10	18 31	8,450	14,930	59,260	195,850	518 62	29 96	.....
27.78	4 17	17·73	3·17	5 95	0 29	18 31	18 31	488·15	862·5	423·14	11314·21	29 96	29 96	11 65

ROTATION 'Z.'

This rotation of three years' duration includes corn, grain and clover hay, in the order named.

Corn comes after the clover hay. The manure is applied in the fall or during the winter and spring, and the clover allowed to grow up through it, so facilitating the turning under of the whole mass of manure and spring growth and late fall growth of clover a few days before the corn is to be sown. The furrow turned is quite shallow, about 5 inches deep, and the land is then thoroughly disc-harrowed and the corn sown in rows 42 inches apart. It receives later the usual cultivation and care.

Grain follows corn, the land having been ploughed in the fall. With the grain there is sown 10 lbs. red clover, 1 lbs. alsike and 5 lbs. timothy seed. The hay is cut twice and the last aftermath allowed to grow up to be turned under the next spring for corn. Such a rotation would be particularly valuable to a farmer having sufficient rough land for pasture or for one desirous of keeping as many cattle as possible on the land at his disposal, supposing him willing to grow roots and corn.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crop.	Crop.	Rent and Manure.	Seed, Twine and use of Machinery.
		Sand.	Sandy Loam.	Clayey Loam.	Clay.	Black Muck.	Gravel.	Hardpan.					
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1904.	1905.	$ cts.	$ cts.
H 1	H.S. 1	30	40	20	10				3·35	Pasture	Roots	20 10	5 59
H 2	H.S. 2	25	45	20	10				3·15	Roots	Grain	18 90	5 64
H 3	H.S. 3	10	20	50	20				2·85	Pasture and soiling crop	Pasture and soiling crop	17 10	2 60
	Aggregate								9·35			56 10	13 74
	Average per acre in 1905								1			6 00	1 47

ROTATION

T 1	S.S. 1	10	90						1·51	Roots	Grain.	9 06	2 45
T 2	S.S. 2	15	85						2·44	Rape	Roots	14 64	2 73
T 3	S.S. 3		100						3·27	Soiling	Pasture	19 62	2 48
T 4	S.S. 4	15	85						3·50	Pasture	Pasture	21 00	
	Aggregate								10·72			64 32	7 66
	Average per acre in 1905											6 00	0 71

ROTATION 'H.'

Hog Farm.

This rotation is of three years' duration and includes roots, soiling crop and pasture in the order named. The land is ploughed late in the fall after it has been manured. It is disked the next spring and the roots sown on ridges. The roots receive the usual cultivation and are of a varied character, including mangels, sugar mangels, sugar beets and turnips devoted to pork production for the most part, the surplus being sold to cattle and the returns invested in meal for pig feeding.

The soiling crop field is sown with various crops suitable for feeding to pigs. What is over and above the amount possible of consumption by pigs is sold to cattle at $2 per ton and the returns used to purchase meal for pork production.

The pasture area is divided into several parts, the seed being sown as far as possible at the same time as the soiling crops the previous year, and not allowed to be eaten too close the first fall, although any good growth is not wasted.

H. 1. This field was this year under roots, turnips, carrots, mangels, sugar beets and sugar mangels. Part of the plot is pastured off with pigs. They had access to all the above sorts of roots, but seemed to prefer mangels and sugar beets.

H. 2. This plot was in grain soiling crop and peas for pasturing off when ripe.

H. 3. This plot was used for pasture after cutting crops of alfalfa and peas and oats for soiling cows.

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'H.'

Items of Expense in Raising Crop of 1905.							Particulars of Crop of 1905.							
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of Manual Labour.	No. of hours with Team.	No. of hours with single Horse.	Value of Horse Labour.	Threshing.	Total Cost.	Cost for one Acre.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crops per Acre.	Profit per Acre in 1905.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
891	133 65	83	63	37 50	.....	196 75	58 73	...	.....	.....	186,532	249 36	74 43	15 70
24	3 60	63	1	19 10	2 07	49 31	15 65	3,448	6,332	.....	.....	79 64	25 28	9 63
6	0 90	23½	....	7 05	1 00	28 65	10 05	794	2,000	.....	12,085	33 02	11 58	1 53
921	138 15	169½	64	63 65	3 07	274 71	.....	4,242	8,332	.....	198,617	362 02	38 70	9 32
98½	14 78	18·1	6·8	6 81	0 33	29 38	29 38	454	891	.... ..	212·42	38 70	38 70	9 32

'T.'

8	1 20	19	1	5 90	.....	18 61	12 25	.....	.....	9,000	10,300	22 20	14 70	1 75
385	57 75	64	29	25 00	.....	100 12	41 03	..	.....	.....	139,245	139 25	57 07	16 04
3	0 45	13	3	4 50	.....	27 05	8 27	.....	. ...	4,000	.... ..	47 41	14 50	6 23
2	0 30	9	1	2 90	.....	24 20	6 90	.....	....	... ...	.....	24 20	6 90	.....
398	59 70	105	34	38 30	....	169 98	..	... ..	.. ..	13,000	149,545	233 06	21 74	5 89
37⅓	5 58	9⅓	3⅓	3 57	.....	15 85	15 85	.....	.....	1,212	13,950	21 74	21 74	5 89

ROTATION 'T.'

Sheep Farm.

This rotation of four years duration includes roots, grain, hay and pasture.

The area devoted to sheep farming is rather limited, about 10·72 acres. This area is not included in the '200-acre farm.' The whole field had been for several years devoted to pasturing sheep, but it has been divided into four rather unequal fields susceptible of further subdivision and devoted to a rotation considered suitable for sheep.

The root field is devoted to white turnips, Swedes, cabbage, Kohl Rabi, thousand headed kale, rape, &c. It comes after the pasture, the land being manured and ploughed in the fall.

Grain follows the root land, and with the grain various clovers and grass seeds are sown to prepare for the ensuing two years. The grain may be harvested or used as soiling crop for sheep. The hay field is expected to give one crop of hay and then be devoted to pasture for lambs as soon as they are weaned.

The pasture field is the field that has been hay the previous year. Alfalfa, red clover, alsike clover, *Bromus inermis* and timothy are the clovers and grasses used.

The crops on this rotation were fairly satisfactory this year.

ROTATION

This rotation of six years' duration

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.	Rent and manure.	Seed, twine and use of machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1904.	1905.	$ cts.	$ cts.
M 1.....	A.S. 2.....	....	30	15	....	45	....	10	1	Oats.....	Oats.....	6 00	2 60
M 2.....	A.S. 4.....	....	30	15	....	45	....	10	1	Oat hay ..	Clover hay....	6 00	0 80
M 3.....	A.S. 6.....	....	30	15	....	45	....	10	1	" ..	"	6 00	0 80
	Aggregate.....								3			18 00	4 20
	Average per acre in 1905.....								1			6 00	1 40
N 1.....	A.S. 3.....	....	30	15	....	45	....	10	1	Oats.....	Oats.....	6 00	1 60
N 2.....	A.S. 5.....	....	30	15	....	45	....	10	1	Oat hay..	Timothy hay..	6 00	0 45
N 3.....	A.S. 7 ...	....	30	15	....	45	....	10	1	" ..	" ..	6 00	0 45
	Aggregate.....								3			18 00	2 50
	Average per acre 1905.....								1			6 00	0 89

ROTATION 'M.'

This rotation of six years duration includes in its crops grain, grain, clover hay and then timothy hay or mixed hay for three years. First year grain is sown on sod ploughed late in the fall. In the spring the land is disked, harrowed and sown with 10-pound of red clover seed per acre at the same time as the grain is sown. After the grain is harvested the clover is allowed to grow as late as possible and the land ploughed the last thing in the fall. The next spring 8 pounds of red clover and 10 pounds timothy seed is sown with the grain and the land put in as good shape as possible.

Clover hay follows the second year grain. It is cut twice in the year and the last aftermath not pastured.

Timothy hay or mixed hay then occupies the land for three consecutive years. Manure is applied in the fall of the second year that the field is under hay.

M 1. This field was sown to oats May 1 and cut August 11. It includes a very considerable area of black mucky soil which on account of the season became infested with weeds and the crop had to be cut and fed green to cattle. In giving the returns for this field this fact was borne in mind and allowance made.

M. 2. This field was under clover hay.

M. 3. This field was the one in the rotation that received manure in the fall of 1904.

'M.'

includes clover in the hay. Area 3 acres.

Items of Expense in Raising Crop of 1905.					Particulars of Crop of 1905.									
Manual Labour.		Horse Labour.												
No. of Hours.	Cost of manual labour	No. of hours with team.	No. of hours with horse.	Value of horse labour	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1905.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
6	0 90	16¾	....	5 02	1 10	15 62	15 62	18 20	36 10	.....	.....	25 42	25 42	9 80
18½	2 77	11	4	4 10	.....	13 67	13 67	..	....	8,830	.....	30 84	30 84	17 17
18½	2 77	11	4	4 10	...	13 67	13 67	... .	.....	10,950	.....	38 32	38 32	24 65
43	6 44	38¾	8	13 22	1 10	42 96	42 96	18 20	36 10	19,780	....	94 58	94 58	51 62
14	2 15	13	3	4 41	0 37	14 32	14 32	6 07	12 03	6,593	.....	31 53	31 53	17 21

'N.'

such as may happen to get in from unknown sources. Area 3 acres.

6	0 90	16¾	½	5 12	0 95	13 57	13 57	15 60	31 90	.....	.....	21 98	21 98	8 41
10	1 50	6	2	2 20	... .	10 15	10 15	... ..	... ..	4,830	.....	19 32	19 32	9 17
10	1 50	5½	2	2 05	.....	10 00	10 00	.....	.....	6,200	.. ....	24 40	24 40	14 40
26	3 90	28¼	4½	9 37	0 95	33 72	33 72	15 60	31 90	11,030	.... ..	65 70	65 70	31 98
9	1 30	9⅓	....	3 12	0 32	11 24	11 24	5 20	10 63	3,676	.....	21 90	21 90	10 66

ROTATION 'N.'

This rotation of six years' duration includes in its crop grain, grain and timothy hay for four years.

The first year's grain is sown on land that had been ploughed six inches deep the fall previous. No grass or clover seed of any kind is sown with it. The stubble is ploughed in the fall and with the grain of the second year timothy seed is sown at the rate of 12 pounds per acre. Every care is taken to insure a good catch and the land put in as good shape as possible to remain in meadow four years.

Timothy hay is then the crop for four years, manure being applied in the fall of the second year of hay.

N 1. This field was sown to oats May 1 and cut Aug. 11. It includes a very considerable area of black mucky soil which on account of the season became infested with weeds, and the crop had to be cut and feed green to cattle. In giving the returns for this field below this fact was borne in mind and allowance made.

N. 2. This field was under timothy hay.

N. 3. This field was the one in the rotation that received manure in the fall of 1904.

ROTATION

This rotation of three years duration has no

Lot.	Location.	Description of Soil.							Area in acres.	Crop.	Crop.	Rent and manure.	Seed, twine and use of machinery.
		Sand.	Sandy loam.	Clayey loam.	Clay.	Black muck.	Gravel.	Hardpan.					
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1904.	1905.	$ cts.	$ cts.
O 1	A. S. 8	....	30	15	....	45	....	10	1	Oat hay	Hay	6 00	0 60
O 2	A. S. 10	....	30	15	....	45	....	10	1	"	Oats	6 00	2 30
O 3	A. S. 12	....	30	15	....	45	....	10	1	Oats	Hay	6 00	1 30
	Aggregate								3			18 00	4 20
	Average per acre in 1905								1			6 00	1 40

ROTATION

This rotation of three years duration

P 1	A. S. 9	....	30	15	....	45	....	10	1	Oat hay	Hay	6 00	1 30
P 2	A. S. 11	....	30	15	....	45	....	10	1	"	Oats	6 00	1 30
P 3	A. S. 13	....	30	15	....	45	....	10	1	Oats	Hay	6 00	0 60
	Aggregate								3			18 60	3 20
	Average per acre in 1905								1			6 00	1 07

ROTATION 'O.'

This rotation is three years' duration and includes grain, timothy hay, timothy hay.

The field intended for grain is ploughed early in the fall and cultivated at intervals to insure the sod rotting. It is ploughed again late in the fall and with the grain, the next spring, timothy seed is sown at the rate of 12 lbs. to the acre.

Timothy hay is cut for two years and the land again ploughed early in the fall. Manure is applied in the fall of the first year under hay.

O 1. This field was under timothy hay.

O 2. This field was sown to oats May 1, cut August 11. It includes a very considerable proportion of black mucky soil which, on account of the season, became infested with weeds and the crop on that part had to be cut and fed green to cattle. In giving the returns for this field below this fact was borne in mind and allowance made.

O 3. This field was under timothy hay and was the field to receive manure in the fall of 1904.

'O.'

clover included in its crops. Area 3 acres.

Items of Expense in raising Crop of 1905.								Particulars of Crop of 1905.						
Manual Labour.		Horse Labour.												
No. of hours.	Cost of manual labour.	No. of hours with team.	No. of hours with single horse.	Value of horse labour.	Threshing.	Total cost.	Cost for 1 acre.	Grain.	Straw.	Hay.	Roots and ensilage.	Total value.	Value of crop per acre.	Profit per acre in 1905.
Hrs.	$ cts.	Hrs	Hrs	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
10	1 50	5½	2	2 05		10 15	10 15	.....	.....	4,290	.....	16 58	16 58	6 43
6	0 90	16½	½	5 05	1 02	15 27	15 27	1,690	3,280	.....	.....	23 46	23 46	8 19
10	1 50	5½	2	2 05	...	10 85	10 85	.....	.....	5,000	.....	20 00	20 00	9 15
26	3 90	27½	4½	9 15	1 02	36 27	36 27	1,690	3,280	9,290	.....	60 04	60 04	23 77
8⅔	1 30	9⅙	1½	3 05	0 34	12 09	12 09	563	1,093	3,097	.....	20 01	20 01	7 92

'P.'

includes clover. Area 3 acres.

18½	2 77½	10½	4	3 95	.....	14 02	14 02	.....	.....	8,210	.....	28 73	28 73	14 71
6	0 90	16½	½	5 05	0 90	14 15	14 15	1,494	3,256	.....	.....	21 45	21 45	7 30
18½	2 77½	10½	4	3 95	.....	13 33	13 32	.....	.....	10,990	.....	38 46	38 46	25 14
43	6 45	37½	8½	12 95	0 90	41 50	13 83	1,494	3,256	19,200	.....	88 64	88 64	15 72
14⅓	2 15	12½	2⅚	4 32	0 30	13 83	13 83	498	1,085	6,400	.....	29 55	29 55	15 72

ROTATION 'P.'

This rotation is of three year's duration and includes grain, clover hay, and timothy hay or mixed hay.

The field intended for grain is ploughed early the previous fall and cultivated at intervals to insure the sod rotting. It is again ploughed late in the fall and left till seed time next spring. With the grain is sown ten pounds clover and ten pounds timothy.

Manure is applied in the fall of the first year of hay.

P 1. This field was under clover hay.

P 2. This field was sown to oats May 1, cut August 11.

It includes a very considerable proportion of black mucky soil which on account of the peculiar weather became infested with weeds, and the crop on that part had to be cut and fed green to cattle.

In giving the returns for this field below this fact was borne in mind and allowance made.

P 3. This field was under clover hay and was the field to receive manure in the fall of 1904.

SUMMARY OF OPERATIONS ON '200 ACRE FARM.'

Returns as per statements, pages 73 to 89 inculsive. . . . . $ 5,590 08

EXPENDITURES.

Rent, labour and manure as per statements on pages 73 to 89 inclusive.	$ 3,444 18	
Extra manure (not included in statements mentioned above but produced by live stock on experimental farm and applied to '200 Acre Farm').	414 00	
Total expenditure.	$ 3,858 18	
		$ 3,858 18
Balance.		$ 1,731 90

REPORT OF THE HORTICULTURIST

(W. T. Macoun.)

December 1, 1905.

Dr. Wm. Saunders, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the nineteenth annual report of this division. The results of some of the most important experiments conducted during the year and information regarding other work of the horticultural division will be found in this report.

CHARACTER OF SEASON.

The winter of 1904-5 while not a very severe one, was marked by long spells of cold weather, but as there was a good depth of snow no special injury was done. Winter set in on November 24, 1904, with snow and frost. The snow gradually increased in depth, but was reduced a little on December 31, when the temperature rose to 35·7°F. This, however, was the only day in December when the temperature rose above freezing, it being a cold month. The coldest day of the month and the coldest of the winter was Christmas day, when the temperature went down to 20·6°F. below zero. January was a moderately cold month. While the temperature rose above freezing it was only for a few hours, and there was no real thaw during the month. The lowest temperature was 20°F. below zero on January 14. The heaviest snowstorm in many years occurred on January 6 and 7, the high wind causing the snow to drift badly. This was followed by another heavy storm on the 10th. By the middle of the month there were about three feet on the level, affording excellent protection for the roots of trees and for low growing plants. February was a cold month, the temperature not once rising above freezing. The lowest temperature was 18·7°F. below zero on the 16th. The weather continued cold up to March 18, the temperature falling to 16°F. below zero on the 14th, a low temperature for March. On the 18th there was heavy rain and the snow may be said to have begun to go on that date. There were about three feet on the level when it began to melt, but there was an almost continuous thaw until April, and by April 1, while there were still patches of snow on the ground, about half the surface of the soil was bare. Owing to the snow coming in November and remaining, there was very little frost in the ground during the winter, hence the soil could be worked soon after the snow disappeared. The first ploughing was done in the orchard on April 15, but spades were used on the 13th. There was very little rain in April and owing to the comparatively cool weather through most of the month it was very favourable for planting. The highest temperature was on the 28th, when it rose to 75°F. The last spring frost recorded was on May 2, when the temperature was 29·5°F., although light local frosts were noticed in this locality later in the month. The weather in May was alternately warm and cool. The highest temperature during the month was 78·8°F. on the 25th. At the end of May the vegetation was from a week to ten days later than the average. Vegetation was showing the need of rain badly at the beginning of June, but on the 2nd there was a fine rain. There was a light frost in low places on June 3. On June 10 the season was considered still ten

days later than the average. From June 12 until July 19, the weather was almost constantly warm. For ten days in June and for sixteen days in July the temperature was 80°F. and above. The highest recorded in June being 86·5°F. on the 20th, and the highest in July 91·4°F. on the 18th. While the weather became a little cooler on July 20, it continued warm until August 12. As there was plenty of rain during this long spell of warm weather growth was rapid. The latter part of August was moderately warm and bright. The highest temperature was 86·6°F. on the 10th. September was moderately warm and with occasional showers up to the 23rd, when it became cool and remained so to near the end of the month. The highest temperature was 80·2°F. on the 10th, and the nearest approach to frost recorded was on September 26, when it fell to 32·2°F. There was, however, a light frost on September 13th, not recorded by the thermometer, which killed cucumbers and melons and in places touched tobacco, although the injury to the latter was not great. On September 26, tomatoes and other tender things were killed. October was a fine month. The first ten days were moderately warm, the temperature rising to 76°F. on the 1st, and the rest of the month varied from cool to moderately warm. The night temperatures were rather low, both in September and October, though no frost was recorded until October 7, when the temperature fell to 29·5°F. The first severe frost was on the 22nd, when the temperature was 22·8°F., and after that date there were several frosts, the lowest occurring on the 30th, when it was 16·5°F. November was cool and frosty. On the 6th there was a fall of 2½ inches of snow, and on the 8th, 2 inches more. This melted slowly, and was practically gone on November 13, when the temperature dropped to 16·8°F., and to 10°F. on the 14th, stopping ploughing. The ground remained frozen, preventing ploughing, until November 24, when there was little frost left in the ground. There was heavy rain on November 26, and on the 27th the ground froze again and winter may be said to have set in on that date.

FRUIT AND VEGETABLE CROPS.

There was a good supply of fruit and vegetables in the provinces of Ontario and Quebec this year, although the apple crop was below the average in most sections of Ontario, and hence there was not as much fruit exported as last year. The light crop of apples this year was no doubt in a measure due to the severe winter of 1903-4, which weakened many trees. This was followed by a bountiful harvest in 1904, which probably further weakened the trees, which were not able to support another good crop this year. In the Ottawa Valley, where the crop was very good, bearing trees were for the most part of hardy varieties, which were uninjured by the winter of 1903-4, the tenderer kinds having been killed outright. Summer and autumn varieties sold at low prices, but winter fruit, for which there was a strong demand, brought very remunerative returns.

The peach, pear, plum, and cherry crops were all good. The cherry rot and ripe rot on the plums, however, caused considerable loss. The grape crop was good and the black rot not nearly so bad as last year. The crops of all bush and small fruits were good. Tomatoes were not so plentiful as last year, owing to the cool spring, but prices were better. Other vegetables were abundant, with the exception of potatoes, which were much injured by blight and rot in most sections, except where sprayed with Bordeaux mixture.

At the Central Experimental Farm the apple crop was good and the fruit practically uninjured by either codling moth or black spot. There was a light crop of Russian pears and cherries, but the crop of Americana and Nigra plums was good; some of the Domestica varieties also fruited this year. The grape crop was very good, but owing to the comparatively cool autumn the fruit did not ripen as thoroughly as in some years, although 90 varieties matured sufficiently to be called ripe. The crops of raspberries, currants and gooseberries were all good. Strawberries bore a medium

crop. Most vegetables did well, but the season was too cool and showery for melons, which were practically a failure, and tomatoes did not yield as much ripe fruit as in drier and warmer seasons. Leaf blight affected the cabbage and cauliflower to a considerable extent, preventing them from developing as well as usual. The potato crop was good where the vines were well sprayed with Bordeaux mixture, but unsprayed plots suffered badly from blight and the crop was much reduced.

MEETINGS ATTENDED AND PLACES VISITED.

During the year the following meetings were attended and addresses given where intimated:—

Quebec Pomological Society, Ayer's Cliff, P.Q., December 14 and 15, 1904: 'Potato Culture.'

Prince Edward Island Fruit Growers' Association, Charlottetown, P.E.I., December 20, 21, 1904: 'Guides to Success in Fruit Culture,' 'Strawberry Culture.'

Society for Horticultural Science, Philadelphia, December 27-28: 'The Horse Bean as a Cover Crop.'

Vermont State Fruit Growers' Association, Vergennes, Vt., February 9-10, 1905. 'The Cherry.' 'The Strawberry.'

Niagara Fruit Growers' Association, meetings at Jordan Station, Queenston and St. Catharines, March 16, 17, 18, 1905. 'Diseases of the Grape' and 'Strawberries.'

Ontario Agricultural Department, Demonstrations in Spraying, St. Catharines and Virgil, April 18-19, 1905.

'Demonstration of Making Kerosene Emulsion with Flour.'

Quebec Pomological Society, St. Hilaire, P.Q., August 23-24, 1905. 'Report on Fruit Exhibits.'

Toronto Exhibition, September 12, 1905. Examination of Fruit Exhibits.

Ontario Fruit Growers' Association.

Ontario Vegetable Growers' Association.

Ontario Horticultural Association, Toronto, November 14, 15, 16, 17, 18, 1905. 'Report on New Fruits.' 'Fruit Growing in Great Britain and Ireland,' 'The Botanic Garden of the Central Experimental Farm,' 'The Best Varieties of Vegetables.'

While in Great Britain and Ireland during the summer of 1905, I visited many places of interest and the information obtained should prove of considerable value in connection with the horticultural work here. Among the places visited may be mentioned the Department of Agriculture, Dublin, Ireland, and the Government Farm and Botanic Gardens at Glasnevin, Ireland; the Daisy Hill Nurseries, Newry, Ireland; the Fruit Districts of Armagh county, Loughgall and Anaghmore, Ireland, being others of principal points visited. Dickson's Nurseries at Belfast were also examined. While in England a visit was paid to the Royal Gardens, Kew; the Horticultural College, Swanley, Kent; the Horticultural College, Reading; Sutton's Trial Grounds, Reading, and the Woburn Fruit Experiment Station, Ridgemont, at all of which places many interesting things were seen.

ACKNOWLEDGMENTS.

It is again a pleasure to acknowledge the services of Mr. J. F. Watson and Mr. H. Holz, who in the performance of their various duties have done much to make the work of the division successful. The faithful work of Mr. F. Horn, foreman in the Arboretum and Botanic Garden, is acknowledged.

The information furnished by many fruit growers in Canada and the United States has been much apreciated, as in order to make the experimental work here of the greatest value it should be supplemented by the experience of others.

DONATIONS.

Each year there are many valuable donations of plants, scions, seeds, etc., and in the following list will be found an acknowledgment of those that were received during the past year.

Donations.	Sender.
New Jersey Experiment Station, New Brunswick, N.J., U.S.	Seeds of corn, tomatoes, peppers, and egg plants.
James Miller, Lyn, Ont.	One Miller Hand marker.
J. F. Wagner, Bennett, Iowa, U.S.	Scions of 194, 197 and 199 Seedling plums.
Wm. A. Anderson, West Union, Iowa, U.S.	Scions of Anderson plum.
Ohio Experiment Station, Wooster, Ohio, U.S.	Apple scions—15 varieties.
L. Cameron, Iroquois, Ont.	Scions of Seedless apple, McIntosh Sweet and Fall Greening.
Ontario Agricultural College, Guelph, Ont.	Pearl of Savoy, Empire State and American Wonder potatoes.
P. Carstesen, Billings' Bridge, Ont.	Scions of early native plum.
C. L. Stephens, Orillia, Ont.	Scions of Northern Spy and King apples.
Trappist Fathers, Oka, Que.	Scions of American Golden Russet apple.
Botanic Garden, Upsala, Sweden	Collection of seeds.
T. Rowan, Macgregor, Man.	Wee Macgregor potato.
John McCarty, Semiwagan Ridge, N.B.	Scions of No. 1 and No. 2 and Esson seedling apples.
Dr. A. Harkness, Lancaster, Ont.	Apple scions.
J. P. Cockburn, Gravenhurst, Ont.	Scions of Rakestrow apple and Gopon plum.
W. H. Dempsey, Trenton, Ont.	Apple scions.
E. Kenny, St. Vincent de Paul, Que.	Scions of seedling apple.
D. E. Bloomfield, Scotland, Ont.	Scions of unknown apple.
W. L. Rowell, Ayers' Cliff, Que.	Scions of Lincoln apple.
C. R. Dickie, Muddy Creek, P.E.I.	Velvet beans.
Miss P. L. Baker, Oakville, Ont.	Scions of seedling apple.
The Templin Co., Calla, Ohio, U.S.	3 plants Cardinal strawberry.
Amherst Agricultural College, Amherst, Mass., U.S.	Scions of Palmer Greening apple.
A. C. Sharpley, Arizona, Man.	Northern Star, Sir John Llewellyn and Duke of York potatoes.
W. L. Scott, Ottawa, Ont.	Scions of unknown apple.
Thos. Bousfield, Carlisle, Ont.	Snider Best Early potato
W. A. Smith, Roblin, Man.	Sutton's Sion House potato.
Vermont Experiment Station, Burlington, Vt. U.S.	Rust-proof, June and Sutton's Discovery potatoes.
Henry E. Wright, Summerside, P.E.I.	2 trees Abegweit plum.
H. G. Schmidt, Cross Lake, Ont.	Four varieties of beans.
J. F. Litooy, Everett, Wash., U.S.	Plants of Mammoth and Himalaya Blackberries and Phenomenal raspberry.
A. M. Smith, St. Catharines, Ont.	Plants of two seedling strawberries.
C. Draffin, Merivale, Ont.	Fantail Rose and Early Pride potatoes.
Chas. H. Smith, Sand Beach, Yarmouth, N.S.	Plants of seedling strawberry.
Thos. C. Paddon, Toronto, Ont.	Scions of seedling plum.
Dr. Mackay, Halifax, N.S.	Plants of Heather.
Hon. F. R. Latchford, Ottawa, Ont.	Buds of Latchford plum.
W. J. Malden, Surbiton, England	Malden's Recorder potato.
L. A. Sovereign, Round Plains, Man.	Potatoes.
John Scott, ———.	Recorder, Duches of Cornwall, and Eldorado potatoes.
———, Oshawa, Ont.	Hard to Beat potato.
Isaac Lindsay, Sawyerville, Que.	Canadian Red potato.
Charles Scott, Melville Cross, Ont.	Magyar potato.
J. M. Macoun, Ottawa, Ont.	Seeds of *Lilium Philadelphieum* from wet ground.
J. W. Johnston, Campbellford, Ont.	Scions of seedling plum.
Miss Maggie McLaurin, Dalkeith, Ont.	Scions of Craignaivie apple.

SESSIONAL PAPER No. 16

THE TESTING AND THE ORIGINATION OF NEW FRUITS AT THE CENTRAL EXPERIMENTAL FARM.

There is a large collection of promising new fruits at the Central Experimental Farm, the result of eighteen years' work in gathering together the varieties advertised by nurserymen and the best seedlings not yet offered for sale. Many seedlings have also been raised from the best varieties which have fruited at Ottawa, and many others from seed imported from Russia. Work in cross-breeding has also been carried on, and varieties originated in this way are now beginning to fruit. If a man sends a seedling fruit for examination and it is considered promising, scions are asked for and if received are propagated and later on the young trees are planted in the orchard. At the present time there are over 100 such promising seedlings of apples alone which are being tested in this way. The results of these experiments take time, and it has always been the policy of the Horticulturist to thoroughly test a variety before recommending it for general planting. For this reason, there have been comparatively few additional kinds added in recent years to the list of those recommended. When we are convinced, however, that a variety is a decided acquisition, the planting of it is strongly recommended. The McIntosh Red apple is an example of this. The information furnished regarding this fine variety has undoubtedly done much to extend the planting of it during recent years.

Nearly 2 000 seedlings of McIntosh Red, Fameuse, Swayzie Pomme Grise, Lawver, Northern Spy, Winter St. Lawrence, Wealthy, Salome and other varieties are under test. This year 37 of these fruited. Few of them were promising, but the majority of them were apples of good size and fair quality. An orchard of 3,000 trees of seedling apples from seed imported from Russia has, after testing the fruit, been reduced to 75 trees, which have borne the best fruit, the rest having been destroyed. While but few of these will prove of value in the warmer parts of Ontario and Quebec, a greater number may be found valuable for the North. In a few years the crosses made with McIntosh Red, Lawver, Northern Spy, Milwaukee and North Western Greening will begin to fruit and from these something good should be obtained. There are also seedling plums, currants, raspberries, grapes and strawberries in the Horticultural Department, of which there are some that we are confident will yet find a place among commercial varieties. Descriptions of the most promising varieties originated and tested at the Central Experimental Farm have appeared from time to time in the annual reports.

SEEDLING FRUITS RECEIVED FOR EXAMINATION—1905.

The following seedling varieties were received for examination this year. Full descriptions are published of those considered promising, and only a partial description of these of less merit. These descriptions are valuable because they constitute a record of all the promising seedling fruits which come under our notice. If any of these varieties should in future years be grown in the commercial nurseries of Canada their history can be traced and the description given by the nurseryman compared with the original description published in these reports. These descriptions not only serve as a record, but they bring these varieties and their characteristics under the notice of many fruit growers who, if they desire, can test the more promising ones themselves, providing of course, that scions can be obtained.

Fruit growers are asked to continue to send in specimens of promising varieties, as in this way those of exceptional merit will find recognition.

Record.	Province.	Name and Address of Sender.	Description of Fruit.
316	Nova Scotia.	E. Zwickers, Oakland ...	Medium size, yellow with a red blush on sunny side; Medium to above medium quality; season autumn; not good enough in quality.
317	Quebec	R. Hamilton, Grenville..	'Large Fameuse Seedling D.' (See full description.)
318	"	" " ..	'No. 10.'—Medium size; pale yellow, well washed with bright crimson; quality good; season October to November. A handsome apple but not sufficiently promising.
319	"	" " ..	'No. 26.'—Below medium size; yellow well splashed and washed with dull crimson; quality good to very good; season November. Too small.
320	"	" " ..	'No. 36.'—Best keeping good apple; medium size; pale yellow splashed with crimson; quality medium; season early to midwinter. Not specially promising.
321	"	" " ..	'No. 4.—Keeper, light green, striped.' (See full description.)
322	"	" " ..	'X.—Resembles Salome.' Medium size; greenish yellow, faintly splashed with pink on sunny side; quality above medium; season early to mid or late winter; not good enough in quality.
323	"	A. J. Langlois, St. Malo.	Medium size; pale yellow splashed and washed on sunny side with crimson; quality good; season mid to late September; not sufficiently promising.
324	Ontario	Samuel Greenfield, Ottawa East.	'Greenfield Seedling.'—Medium to above medium in size; pale greenish yellow splashed and washed with crimson; quality above medium; season early to mid August; not equal to Lowland Raspberry.
325	"	Ed. Hall, Ottawa.....	Medium size; greenish yellow, splashed and washed with crimson; quality medium to above medium; season evidently September to October. A handsome apple but not good enough in quality.
326	"	John McKay, Creemore.	Medium size; yellow well washed with dark crimson; medium quality; season mid to late September; not sufficiently promising.
327	" ...	C. L. Stephens, Orillia..	Below medium size; yellow with a faint pink blush; quality good; season evidently mid to late September; too small and not sufficiently attractive.
328	" ...	Thos. A. Harsant, Glen Orchard.	Two small apples of inferior quality; one pale yellow with a few crimson splashes; the other, pale yellow with a pink blush.
329			
330	"	Wm. Pratt, Penetanguishene.	Medium size; yellow well splashed and washed with crimson; quality above medium; season evidently October. Handsome but not as good as Wealthy, which is of the same season.
331	"	Wm. Pratt. Penetanguishene.	See full description.
332	"	J. J. McGovern, Ottawa.	Large; pale yellowish green splashed and streaked with dull purplish red; quality medium; season evidently October.
333	"	R. Couglan, M.D., Hastings.	See full description.
334	"	R. A. Marrison, Cataraqui.	See full description.
335	"	E. Lafontaine, Ottawa ..	Size above medium; greenish yellow splashed and washed with crimson; quality above medium; season October; not sufficiently promising.
336	"	Louis Charron, Ottawa..	Large; pale green with a crimson blush on sunny side; quality above medium; season probably October to November; not sufficiently promising.
337	"	Sam. Greenfield, Ottawa East.	'Greenfield No. 6.'—Above medium size; pale green splashed and streaked with dull red on sunny side; quality good; season late autumn to early winter; not attractive in appearance. Not as good as McIntosh which is of the same season.
338	"	Sam. Greenfield, Ottawa East.	'Greenfield No. 5.'—Above medium to large; yellow well washed with rather bright crimson; quality above medium; season evidently October to November; not juicy enough for a good sweet apple.
339	"	W. L. Scott, Ottawa.....	See full description.



Photo. by F. T. Shutt.

English Horse Beans, used for Snow and Wind-break. April 26th, 1905.



Photo. by F. T. Shutt.

Wealthy Apples Packed for Shipment to Glascow.

Record.	Province.	Name and Address of Sender.	Description of Fruit.
340	Manitoba ..	A. H. Rogers, Gladstone.	Seedling No. 1.—Small, $1\frac{1}{2}$ by $1\frac{3}{4}$ inch.; greenish yellow; quality above medium; season evidently October.
341	" ..	" " ..	Seedling No. 2.—Small, $1\frac{1}{4}$ by $1\frac{1}{2}$ inch.; yellow, with a bronze blush on sunny side; quality medium to below; season evidently October; not very promising.
342	" ..	" " ..	Seedling No. 3.—Quite small; green well washed with deep crimson; too small.
343	Ontario ...	W. C. Wilson, Hawkstone.	Medium size; yellow, washed and splashed with orange red; mildly subacid; season late winter; not sufficiently promising.
344	"	Maggie McLaurin, Dalkeith.	See full description of 'Craignaivie.'
345	Quebec.....	W. L. Rowell, Ayer's Cliff.	See full description of 'Lincoln.'

APPLES.

No. 317. From R. Hamilton, Grenville, Que.—Large Fameuse Seedling, D.—Fruit above medium size; form oblate; cavity medium depth and width; russeted at base; stem short, moderately stout; basin open, medium depth, nearly smooth; calyx open; colour pale yellow or whitish well washed and splashed with crimson; dots obsecure; skin moderately thick, rather tough; flesh white, slightly tinged with red, tender, juicy; core medium; subacid, pleasant, Fameuse-like flavour; quality good to very good; season probably October to mid November.

A good dessert apple, much like Fameuse in quality but coarser in flesh.

No. 321. From R. Hamilton, Grenville, Que., 'Keeper, light green, striped with red, well coloured on top of tree. No. 4.'—Fruit medium size; form roundish to oblate; cavity open, deep; stem short, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour pale greenish yellow washed with red on sunny side; dots indistinct; skin moderately thick, tender; flesh white, tender, juicy; core small; mildly subacid, pleasant flavour; quality good to very good; season probably early to mid winter.

A good deal like Princess Louise both in appearance and quality. May be promising.

No. 331. From Wm. Pratt, Penetanguishene, Ont., Seedling No. 2.—Fruit medium size; form roundish; cavity narrow, medium depth; stem medium length, moderately stout; basin medium depth and width, wrinkled; calyx partly open or closed; colour yellow well washed and splashed with rich crimson; dots numerous, yellow, distinct; skin moderately thick, rather tough; flesh dull white, firm, juicy; core small; subacid, pleasant flavour, not high; quality above medium; almost good; season probably early winter to mid winter. Supposed to be a seedling of Wealthy. Grown on an adjoining farm to Wm. Pratt. A handsome apple.

No. 333. From R. Couglan, (M.D.), Hastings, Ont.—Fruit medium size; form oblate to roundish; cavity deep, medium width, russeted; stem short, slender; basin medium depth and width, smooth; calyx partly open; colour yellow, almost entirely covered with bright crimson; dots moderately numerous, yellow, distinct; skin moderately thick, tender; flesh white, tinged with red, tender, juicy; core small; briskly subacid, little decided flavour, quality above medium; season probably mid September.

A seedling growing in a remote part of farm near Hastings village.

A very handsome apple with an aroma. Of good shape. May prove a useful apple at this season of the year.

No. 334. From R. A. Marrison, Cataraqui, Ont., Seedling Crab Apple.—Fruit large for a crab; 2 by 2½ inches; form roundish, slightly angular; cavity medium depth and width; stem long, slender; basin open, medium depth, much wrinkled; calyx closed; colour yellow well washed with deep crimson and splashed with dark crimson; dots few, yellow, distince; skin moderately thick, moderately tough; flesh yellow, tender, juicy; core medium; briskly subacid, pleasant flavour, very little astringency; quality good for a crab; season probably early to mid October.

A handsome crab of the largest size. May prove desirable as a late variety.

No. 344. Craignaivie—Seedling from Maggie McLaurin, Dalkeith, Ont.—Fruit large; form roundish to oblate, conic; cavity deep, medium width; stem medium length, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour pale yellow, well washed on sunny side with bright red; dots obscure; skin rather thin, tender; flesh white, tender, melting, juicy; core medium, mildly subacid; quality good to very good; season probably mid winter to late winter.

A handsome apple of good quality, and if hardy may be useful. 'A graft from a seedling planted by my father long years ago. Very good cookers and bakers.'

No. 345. Lincoln—Seedling from W. L. Rowell, Ayer's Cliff, P.Q.—Fruit above medium size; form roundish conical; cavity narrow, shallow; stem short, slender; basin shallow, narrow; calyx closed; colour pale yellowish green splashed and washed with dull dark purplish red; dots obscure, skin thick, tough; flesh white, tender, juicy; core medium; mildly subacid, pleasant flavour; quality good; season probably mid to late winter. Resembles Winter St. Lawrence very much in outward appearance. A good dessert apple.

APPLES.

After the severe winter of 1903-04, which killed so many varieties of apples in the orchard at the Experimental Farm, a number of trees not killed outright were left in a weakened condition. Most of these either died since or have been removed, so that quite a number of vacancies occurred in the orchard this year. These were practically all filled by other kinds or by more trees of the varieties which withstood the winter of 1903-4. The winter of 1904-5 was a favourable one and few additional kinds were injured. There are still in the apple orchards 435 varieties exclusive of the seedlings originated at the Central Experimental Farm. Owing to the favourable season, the trees made fine growth this year. The crop was good and the fruit clean, being practically free of both spot and codling moth. The early varieties were sprayed three times with Bordeaux mixture, and the later ones four times. There were 193 varieties which fruited.

Three different cover crops consisting of hairy vetch, rape and buckwheat were used this year to aid in protecting the roots of trees this winter in the standard orchard. The Russian orchard was in sod this year, but this will be broken up in the spring.

VARIETIES OF APPLES NEW OR NOT WELL KNOWN IN ONTARIO AND QUEBEC.

Many descriptions of apples have been made at the Central Experimental Farm during the past eighteen years, and a large number have been published from time to time in the annual reports, but as there are many others which have not been, it is considered advisable to continue publishing descriptions of the newer and not well known sorts. The following descriptions were all made from fruit grown at the Central Experimental Farm, with a few exceptions, from outside sources, which are mentioned.

Allen Choice.—Originated in Pennsylvania:—Fruit below medium size; form oblate; cavity medium depth and width; stem short to medium, moderately stout; basin shallow, open, wrinkled; calyx open; colour pale yellow splashed and washed with deep red; dots moderately numerous, grey, distinct; skin moderately thick, tender; flesh yellowish, crisp, juicy; core small; subacid, pleasant flavour, sprightly; quality good; season mid winter to late winter.

A pretty apple of good quality. A little under sized, but evidently a good keeper. Not sufficiently hardy at Ottawa.

Arthur.—Originated in Northern Iowa:—Fruit roundish to oblong; size medium; cavity deep, narrow, slightly russeted near base; stem long, slender; basin deep, medium width, smooth; calyx open or closed; colour yellow splashed and streaked with purplish red, mostly on sunny side; dots moderately numerous, grey, distinct; skin thick, rather tough; flesh yellow, rather coarse, moderately juicy, subacid; core small to medium; quality medium; season early to mid winter. Tree hardy, vigorous and productive, but not desirable here.

Bessie.—Originated in Wisconsin:—Fruit roundish, angular; size large to very large; cavity deep, medium width, russeted; stem short, stout; basin deep, medium width, almost smooth; calyx open; colour pale yellow well splashed and streaked with bright red; dots few, pale, indistinct; skin moderately thick, tender; flesh white, crisp, rather coarse, juicy, subacid; core small; quality above medium; season late September, October. Tree hardy, vigorous and a moderate bearer. A large, handsome apple, but too coarse for dessert.

Bismarck.—Originated in New Zealand:—Fruit roundish, conical; size large; cavity deep, medium width, russeted; stem short, slender; basin deep, open, wrinkled; calyx open; colour greenish yellow, well washed and splashed with rich crimson; dots obscure; skin moderately thick, moderately tough; flesh dull white, coarse, juicy subacid; core small; quality medium; season November, December. Tree a poor grower, but an early and abundant bearer. Quality not good enough. Of doubtful hardiness. Fruit received from W. H. Dempsy, Trenton, Ont.

Black Annette.—Originated in Ohio:—Fruit roundish; size small; cavity medium depth and width, russeted; stem medium length, slender; basin open, shallow, wrinkled; calyx open; colour yellowish green washed with deep, dull purplish red; dots numerous, small, pale distinct; skin rather thick, tough; flesh greenish yellow, moderately juicy, tender; core medium; briskly subacid, somewhat like R. I. Greening in flavour; quality above medium; season late winter. Tree an early bearer. Hardy until winter of 1903-4.

Brockville Beauty.—Originated in Eastern Ontario:—Fruit roundish, conical; size medium to above medium; cavity open, medium depth; stem short, stout; basin medium depth and width, slightly wrinkled; calyx open; colour pale yellow well washed and splashed with orange red; dots obscured; bloom none; skin rather thick, tender; flesh yellow, firm, coarse, moderately juicy, brickly subacid; core medium; quality above medium; season early September. Tree vigorous and productive, but fruit drops badly. A pretty apple.

Cellini.—Originated in England:—Fruit roundish, obtusely conical; size large to very large; cavity medium depth and width or rather open, russeted; stem medium length, stout; basin deep, very open, slightly wrinkled; calyx open; colour greenish yellow well washed and splashed with deep red; dots obscure; skin rather thick, tender; flesh white, tinged with yellow; tender, melting, moderately juicy; core small, briskly subacid with a high flavour; quality good to very good; season late October to November. Quite hardy at Ottawa. Tree vigorous and productive.

Clayton.—Originated in Indiana:—Fruit above medium size; form oblate, conic, angular; basin medium depth and width, slightly wrinkled; cavity medium depth, open, stem short to medium, stout; calyx partly open; colour pale green washed and splashed with dull red; dots few, pale, indistinct; skin thick, tough; flesh firm, crisp, greenish yellow, juicy; core rather small; subacid not high flavour; quality above medium; season late winter. A good keeper. Not quite hardy enough at Ottawa.

Coo's River Beauty:—Fruit, medium to large size; form oblate; cavity deep, open, lightly russeted; stem very short, slender; basin deep, medium width almost smooth, calyx open; colour pale yellow well washed with bright crimson; dots few, yellow, distinct; skin moderately thick, tough; flesh white, crisp, tender, juicy; core medium; subacid, sprightly, pleasant flavour; quality good to very good; season early to mid winter.

A handsome apple. A promising variety for the best apple districts. Fruit received from W. H. Dempsey, Trenton, Ont.

Dyer (Pomme Royale).—Originated in France:—Fruit roundish; size medium; cavity medium depth and width; stem medium length, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour pale yellow; dots obscure; skin moderately thick, tender ; flesh white, very tender, breaking, very juicy, pear-like; core medium size, open; mildly subacid, with a sprightly, delicious, pear-like flavour; quality best; season October. Hardy in garden of Maurice Bennett, Ottawa, from which fruit was obtained and described.

Duke of Connaught:—Fruit oblong, conical; size large to above medium; cavity deep, narrow, sometimes slightly russeted; stem short, moderately stout; basin medium width, medium depth, wrinkled ; calyx rather small, closed ; colour golden yellow, sparingly splashed with pink on sunny side ; dots numerous, grey, distinct but not conspicuous ; bloom none ; skin slightly oily, moderately thick, rather tough ; flesh yellow, firm, fairly juicy; core large, open; subacid, pleasant flavour; quality above medium; season early to mid winter. Tree hardy and vigorous but not productive enough.

Excelsior Crab.—Originated in Minnesota.—Fruit roundish, angular; size very large for a crab, about the size of a medium apple, cavity narrow, shallow to medium in depth; stem long to medium, moderately stout; basin shallow to medium in depth, narrow, slightly wrinkled; calyx closed or partly open; colour pale yellow, well washed on sunny side with bright red; and extending nearly around the apple in some cases; dots few, yellow, distinct but not prominent ; bloom slight ; skin moderately thick, tender; flesh yellowish, tender melting, juicy ; core large, open ; subacid, pleasant flavour; quality good as a crab, above medium to good as an apple; season early to mid September. Tree vigorous and very productive. A handsome fruit, more like an apple than a crab, but flesh has some crab characteristics.

Fameuse Noire.—Originated in the province of Quebec:—Fruit roundish conical; size medium; cavity narrow, medium depth, slightly russeted near base; stem medium length, slender; basin narrow, medium depth, slightly wrinkled; calyx open; colour greenish yellow well splashed and washed with dark red over most of surface; dots few, small, yellow, distinct; skin moderately thick, tough; flesh white, tender, crisp, juicy, a slight tinge of red in spots; core small to below medium; mildly subacid, Fameuse-like flavour, but not as good; quality good; season mid October to mid November. Tree productive but lacks vigour. Not as good an apple as Fameuse.

Forest—Originated in Wisconsin:—Fruit above medium size; form oblong to roundish conical; cavity medium depth and width, sometimes lipped, russeted; stem short, stout; basin medium depth and width, wrinkled; calyx open; colour greenish

yellow washed with deep rather dull red, mostly on sunny side; dots few, grey, distinct; skin thick, rather tough; flesh yellow, crisp, juicy; core small; subacid, good, pleasant flavour; quality good to very good; season mid to late winter. Tree hardy. Would be very promising if fruit was a little more attractive. Scions received from the late J. L. Budd, Ames, Ia.

Frazer's Russet.—Fruit about medium size; form roundish to oblate, obtusely conical; cavity medium depth, open, russeted; stem medium length, moderately stout; basin medium width and depth slightly wrinkled; calyx small, partly open; colour greenish yellow, sparingly splashed with purplish red on sunny side; dots obscure; skin moderately thick, tender; flesh dull white, crisp, somewhat coarse, moderately juicy; core small; mildly subacid, pleasant flavour; quality above medium to good; mid winter to late winter. Tree hardy.

Owing to hardiness of tree, this may prove a useful apple.

Hoadly.—Originated in Wisconsin:—Fruit oblate; size above medium; cavity deep, moderately open, slightly russeted; stem short, slender; basin medium depth and width, almost smooth to slightly wrinkled; calyx open, colour yellow splashed and streaked with carmine; dots few, yellow, indistinct; skin thick, moderately tender; flesh yellowish with traces of red, juicy, rather tender, briskly subacid; pleasant flavour; core medium; quality above medium; season October. Tree an upright grower, hardy and productive. Scions obtained from the late J. L. Budd, Ames, Iowa.

Langford Beauty (Russell).—Originated in Russell County, Ontario:—Fruit medium to above medium in size; roundish to oblate; skin pale yellow, almost or completely covered with deep red; dots few, grey, not prominent; cavity shallow, open; stem long, slender; basin shallow, open, slightly wrinkled; calyx closed; flesh white, tender, melting, juicy, subacid, with a pleasant flavour, having a suggestion of Fameuse about it, slightly astringent; core large; quality good; season middle of August to middle of September. Tree vigorous. Top grafted on Wealthy at the Central Experimental Farm; it has produced good crops every other year. It ripens unevenly and drops badly, making it more desirable for home use than for commercial purposes.

The apple described under the name of Russell in Bulletin No. 37, Experimental Farms Series, has been found to be the same as this variety.

Lord.—A seedling of Wealthy, originated in Minnesota:—Fruit roundish conical; size medium; cavity deep, medium width; stem medium length, moderately stout; basin deep, narrow to medium, slightly wrinkled; calyx partly open; colour pale yellow almost covered with crimson; dots obscure; skin thick, rather tough; flesh white tinged with red near skin, moderately juicy, tender; core small, briskly subacid, pleasant flavour; quality above medium to good; season November.

A handsome apple, but not specially promising. Not juicy enough.

Newell (Orange Winter).—Originated in Wisconsin:—Fruit oblate conic; size large; cavity deep, open; stem short, moderately stout; basin narrow, medium depth, wrinkled; calyx open; colour yellow, slightly washed with pink; dots fairly numerous, grey, distinct; skin moderately thick, tender; flesh yellow, crisp, moderately juicy; core medium size; subacid, spicy, good flavour; quality very good. Season, mid to late winter. Tree moderately productive, but not as hardy, as some others.

A pleasant dessert apple, but fruit is not attractive. May be useful.

Newtown Spitzenburg (Flushing Spitzenburg)—Originated on Long Island, N.Y.:—Fruit oblate to roundish, conical; above medium to large; cavity deep, narrow slightly russeted; stem short, moderately stout to slender; basin narrow, shallow, smooth, calyx open; colour yellow, well splashed and washed with deep orange red; dots fairly numerous, large, grey or yellow, distinct; skin moderately thick, tough;

flesh yellow, very tender, juicy; core medium, open; mildly subacid, pleasant flavour; quality good; season early winter.

October.—Originated in Minnesota:—Fruit roundish, angular; size medium to below; cavity deep, medium width, slightly russeted; stem medium length, moderately stout; basin shallow, medium width, considerably wrinkled; calyx closed or partly open; colour yellow, splashed and washed with deep red; dots few, yellow, indistinct; skin rather thick, tender; flesh yellowish, rather coarse, crisp, tender, moderately juicy, briskly subacid; core medium; quality almost good; season late September and early October. Tree vigorous and productive but fruit is very subject to dry rot making this variety quite undesirable.

Renaud (Argenteuil)—Originated in Argenteuil Co., Que.:—Fruit medium size, form oblate, irregular, angular; cavity narrow, medium depth; stem short, slender; basin medium depth and width, wrinkled; calyx closed; colour greenish yellow splashed and streaked with dull purplish red; dots obscure; skin moderately thick, tough; flesh yellowish, juicy, tender; core medium; briskly subacid, pleasant but not high flavour; quality above medium; season late winter.

May be useful but is not attractive.

Springdale.—Originated in Arkansas:—Fruit roundish; size medium; cavity narrow, medium depth; stem clubbed, short, stout; basin medium depth and width, smooth; calyx open; colour greenish yellow, well washed with dark red; dots few, yellow, distinct; skin rather thick, tough; flesh white, firm, moderately juicy subacid; core small; quality above medium; season late winter. Not a very handsome apple, but is a good keeper.

Titovka (Gipsy Girl).—Originated in Russia:—Fruit roundish conical, angular; size large to very large; cavity deep, medium in width, slightly russeted; stem short, stout; basin deep, medium width, wrinkled, calyx closed or open; colour pale yellow well splashed or almost covered with bright red; dots obscure; bloom none; skin moderately thick, tender; flesh, yellow, firm, rather coarse, juicy; core small, closed; subacid, not high flavoured; quality medium to above medium; season early September to mid September. Tree hardy, vigorous and productive. A handsome apple.

Walworth Pippin.—Originated in New Jersey:—Fruit roundish, obtusely conical, angular; size medium; cavity medium depth and width; stem short, slender; basin narrow, medium depth, wrinkled; calyx closed; colour green with a faint blush; dots fairly numerous, large, white, distinct; skin moderately thick, tender; flesh greenish yellow, firm, juicy; core medium size; subacid, no decided flavour; quality medium; season late winter. Tree vigorous. Fruit does not mature well at Ottawa.

Stone.—Originated in Vermont:—Fruit large to very large; form roundish, irregular, angular; cavity narrow sometimes closed, shallow; stem short, slender; basin narrow, shallow, slightly wrinkled; calyx partly open; colour yellowish green, splashed and washed with dull, deep, purplish red; dots moderately numerous, grey, distinct; skin thick, tough; flesh yellowish, crisp, tender, juicy; core small; mildly subacid, spicy, good flavour; quality good; season mid winter to late winter.

Appearance is rather against this apple, as it is not attractive, but it is a fair dessert apple. Tree apparently very hardy.

Winter Rose.—Originated in Dundas county, Ontario:—Fruit oblate; size above medium; cavity medium depth, narrow, lipped towards base of stem; stem short, moderately stout; basin narrow, shallow to medium, slightly wrinkled; calyx partly open or open; colour yellowish green well washed with dull red; dots obscure; skin rather thick, tough; flesh white, tender, moderately juicy subacid; core small; quality

above medium; season early to mid winter. Tree hardy, vigorous and an early bearer. May be useful in the north.

A CLOSELY PLANTED WEALTHY APPLE ORCHARD.

Considerable interest has been shown in the results obtained from a small, closely planted Wealthy apple orchard at the Central Experimental Farm. There are 129 trees now living in this orchard, occupying about one-third of an acre. The trees were originally 10 x 10 feet apart, but a few have died. The trees were planted in the spring of 1896. Full details regarding the returns from this orchard were published in the annual report for 1904. In that report it was shown that the average net profit per acre from the time of planting was $54.13, and from the time of fruiting, $106.19. There was a heavy crop in the orchard in 1904, and the crop this year was medium. The total crop produced was 1,247 gallons, of which 631 was picked fruit and 616 windfalls. Part of the windfalls was sold in baskets as they were good apples, and they brought fair prices.

The following sales were made:—

SALE OF FRUIT FROM CLOSELY PLANTED WEALTHY ORCHARD, 1905.

		Estimated per acre.
Sold, 203 baskets at 17½	$ 35 52	$107 45
" 22 baskets at 20c	4 40	13 31
" 2 bags at 25c	0 50	1 51
" 42 boxes (Glasgow) at $1.46	61 32	185 49
	$101 74	$307 76

Expenses, 1905.

225 baskets and covers at $5.25 per 100	$ 11 81	$ 35 73
42 boxes at 14½c	6 09	18 42
Freight on boxes	14 94	45 19
Commission on sales	6 92	20 93
Rent on land	0 99	3 00
Spraying	2 49	7 53
Picking fruit	9 00	27 22
Grading and packing fruit	8 41	25 44
Barnyard manure (8 tons at 50c)	4 00	12 10
Pruning	3 00	9 07
	$67 65	$204 63
Net profit, 1905	34 09	103 13
Average net profit per acre per year, 1896-1905		59 03
" " 1899-1905		105 75

These receipts and expenditures are estimated from about one-third of an acre ($\frac{40}{121}$) and the estimated figures per acre are given on the assumption that the percentage of sales in boxes and baskets would be the same from a full acre. A record is kept of the time actually spent in caring for this orchard and the other expenses incurred. Labour is valued at 15 cents an hour. There was no expense for cultivating since 1902, as the trees being close, cultivation is impossible. The grass that grows is left to die down and rot. As the trees were beginning to interlace, about half of them

were severely headed back in the spring of 1905, and the remainder will be thus treated next spring. The apples on the trees headed back were much larger than on the others, and while the crop was reduced somewhat the greater percentage of marketable fruit compensated to a considerable extent for the loss of crop. The orchard received a heavy application of barnyard manure in December, 1904.

EXPERIMENTAL APPLE SHIPMENT TO GLASGOW, 1905.

This year a small shipment of 80 boxes of apples was made to Glasgow by the steamer 'Lakonia,' which sailed from Montreal on October 5.

One object of the shipment was to market the fruit raised at the Experimental Farm to the best advantage, and another was to compare the results from different methods of packing. Two styles of boxes were also compared. All the fruit was shipped in boxes 10 by 11 by 20 inches, and consigned to Thos. Russell, Fruit Bazaar, Glasgow, Scotland.

32 boxes XXX Wealthy, without any packing material in boxes, sold at 6 shillings per box.

26 boxes XXX Wealthy, with thin layer of Excelsior and a sheet of cardboard at top and bottom, sold at 6 shillings per box.

11 boxes Winter St. Lawrence, without any packing material in boxes, sold at 5 shillings per box.

11 boxes Patten's Duchess (Myer's folding boxes), without any packing material in boxes, sold at 4 shillings per box.

Total receipts for 80 boxes	$ 109 09
Freight on goods: River and Harbour Duties, &c., Marine Insurance: Commission and guarantee	33 91
Cost of boxes	11 65
Sorting and packing	14 40
Total expenses	$ 59 96
Net profit	$ 49 13

While the profit on this shipment is not large, it is very fair for autumn apples. In a small shipment of this kind the price of boxes and the cost of sorting and packing are greater than they would be if large quantities were handled.

The following correspondence was received regarding this shipment:—

'GLASGOW, October 28, 1905.

'We beg to send you herewith account sales for your consignment of 80 boxes of apples ex S. S. 'Lakonia' and draft for L 15-8-9 sterling in payment of net proceeds, which please acknowledge. I trust the result of this experimental consignment will be satisfactory to you, and have to report that the fruit arrived here in good condition, and we could see no difference in quality or landing condition of the Wealthy packed with Excelsior and the difference in boxes did not seem to make any difference in the carrying of the fruit, for although the Patten's Duchess packed in the new style of box (Myer's folding box) made only 4—as compared with 6—for the Wealthy, still this is accounted for by the fact that Wealthy are a much more popular apple here.'

(Signed) THOMAS RUSSELL.

Apple shipment to Winnipeg:—Fifty boxes of apples, consisting of Antonovka, Golden White and Anis were shipped to Winnipeg on September 21, 1905. After deducting freight and commission the net return from this shipment was $35.10, or about 70c. per box.

Final statement of shipments made in 1904:—In the Annual Report for 1904 a statement was made regarding six trial shipments of apples to Ireland and Scotland. The prices obtained for the fruit and other details were given in the report, but as the charges on four of the shipments had not been received when the report was published it was not possible to give the profit or loss. As the markets were glutted with fruit when the apples were sold, and hence the prices obtained small, there was a small loss on these four shipments, although the other two gave fair profits. The net returns from the 350 boxes in question were $78.87, or 22.53 cents per box. The boxes cost 14½c. each and deducting this from 22·53c. there are left but 8c. for sorting and packing, which does not cover the cost of this work.

INDIVIDUALITY OF FRUITS.

In the annual report for 1903 attention was drawn to the marked difference in yields of trees of the same variety of apple planted at the same time and under apparently very similar conditions. A table was published giving the yields of some trees from the time, the first records were taken until 1903. Following will be found the same table with the addition of the yields for 1904 and 1905. It will be noticed that Wealthy, Tree 4; McMahan White, Tree 1; McIntosh Red, Tree 1; and Patten's Greening, Tree 1, which had yielded the most up to 1903, still prove the most productive, though some of the other trees have gained on them. It is of interest to note the variation in yield of the different trees from year to year. Trees are being propagated from the most productive and from the least productive trees in order to find if these characteristics are retained in other trees. Top grafts have also been made for the same purpose.

APPLES—WEALTHY.

(Planted, 1896)—Yielded in Gallons.

Tree.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	Total Yield 1899-1905.
1	1·0	2·25	2 75	15·0	.....	17·0	1·0	39·0
2	2·0	·5	2·5	12·0	.....	14·0	8·0	39·0
3	1·75	12·0	2·25	8·0	.....	6·5	7·0	37·5
4	9·0	2·25	15·5	20·5	27·0	1·0	28·0	103·25
5	7·5	6·5	7·75	23·0	7·5	23·0	13·0	88·25
6	3·25	6·5	3·5	24 0	.....	17·5	5·0	59·75
7	7;5	1·0	10·0	19 0	16·0	.....	19·0	72·5
8	.....	8·5	·5	21·5	.....	10·0	5·0	45 5
9	.....	11·25	·25	27·5	.....	21·0	20·0	80·0
10	1·0	12·25	.....	30·0	.....	17·5	8·0	68·75
11	1·25	11·25	.....	21·5	.....	31·0	10·0	75·0
12	.....	7·5	.....	18·5	2·0	13·5	13·5	55·0
13	4·25	6·25	4·5	20·0	·5	20·5	19·0	75·0
14	2·5	5 5	·5	34·0	.....	17·0	8·0	67·5
15	.....	2·25	3·5	21·5	8·5	31·5	16·0	83 25
16	3·0	2·25	4·0	22·5	4 5	16·5	23·5	76·25
17	.....	2·0	1·0	22·5	.....	8·5	16·0	59 0

APPLES—McMAHAN WHITE.

(Planted, 1888)—Yielded in Gallons.

Tree.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	Total Yield 1899–1905
1	62·0	.....	83·0	2·0	147·0	1·5	141·0	40·0	476·5
2	42·0	1·0	6·0	12·5	98·0	23·0	116·0	30·0	328·5
3	32·0	29·0	49·0	18·0	55·0	63·5	56·0	108·0	410·5
4	35·0	.....	34·5	4·0	63·0	34·0	67·0	69·0	306·5
5	.....	37·5	55·0	49·0	.....	61·0	.....	98·0	300·5
6	29·0	4·5	46·0	·5	69·5	43·0	72·0	96·0	360·5
7	·5	9·5	19·5	4·0	19·0	39·5	14·0	37·0	143·0
8	7·0	9·0	27·0	9·0	53·0	15·5	54·0	35·5	210·0

APPLES—McINTOSH RED.

(Planted, 1890)—Yielded in Gallons.

Tree.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	Total Yield 1899–1905
1	17·5	26·0	37·0	6·5	71·5	94·0	12·0	109·0	373·5
2	1·0	9·5	10·5	1·0	37·5	31·0	6·0	72·0	168·5

APPLES—PATTEN'S GREENING.

(Planted, 1892)—Yielded in Gallons.

Tree.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	Total Yield 1899–1905.
1	27·0	2·0	35·0	1·5	71·0	15·0	84·0	34·0	269·5
2	2·0	6·0	14·0	19·0	24·0	55·5	7·5	66·0	194·0
3	2·0	31·0	1·5	40·5	22·0	67·0	26·0	69·0	259·0
4	13·0	.....	6·5	.....	12·0	15·0	45·0	45·0	136·5
5	1·0	.....	19·0	·5	17·5	21·0	54·0	75·0	188·0

PLUMS.

There was a good crop of plums this year, but most of the fruit consisted of Americana and Nigra varieties. A few European or Domestica plums had a light to medium crop. The largest crop of Domestica plums was from the Mount Royal, one of the Montreal seedlings. The Mount Royal and Raynes are two of the hardiest of these seedlings and are very desirable plums. The Americana plums sold well. There were 457 baskets sold, for which $138.25 was received. The highest price received was 47½ cents per basket, and the lowest, 22½ cents. The average price was 29½ cents.

One new Experimental Farm Americana seedling of merit was named this year, a description of which follows:—

Kilmore (Yosemite Purple Seedling):—Size large; form roundish, slightly flattened; cavity medium depth and width; suture a distinct line; colour bright purplish red; dots moderately numerous, yellow, distinct; bloom moderate; skin moderately thick, moderately tough; flesh deep yellow, juicy; stone above medium, oval, considerably flattened, almost free; sweet, rich, good flavour; quality good. Promising. Season medium late.

CHERRIES.

As a rule the fruit buds of practically all varieties of cherries are winter-killed at the Central Experimental Farm. When, however, there are no very low temperatures there is a fair crop on a few varieties. Last winter the lowest temperature was only 20·6° F. below zero and there were no long spells of very cold weather, hence it was a little more favourable for cherries. As a result a few varieties produced fair crops. These were Orel 25, Vladimir, Minnesota Ostheim, Cerise d'Ostheim, Lithaur Weichsel, Heart-shaped Weichsel, Griotte du Nord, and Orel 24. The best crops were on trees of the first four varieties, which have in the past shown themselves to be of greater hardiness in fruit bud than others. The Orel 25 is probably the hardiest of all.

PEARS.

Pears are not a success at Ottawa, none of the better varieties having survived. The Flemish Beauty has proven the hardiest good pear, but the tree blights and it does not live long. At Oka, lower down the Ottawa river, this variety succeeds well. The Goliva Kurskaya, Dvinnoe Solovieff, and Zuckerbirn, which are among the hardiest and freest from blight, fruited this year, but they are all of inferior quality. Some seedling pears are being grown in the hope of getting some better hardy sorts.

GRAPES.

This was only a moderately favourable season for grapes. The crop was probably the largest that the vines have borne and the bunches were well filled and the fruit of good size and little affected by disease, but owing to the comparatively cool autumn and the cool nights the grapes did not become as sweet as they sometimes do. Robins were very troublesome and at the beginning of the season destroyed a large quantity of grapes, a flock of these birds apparently making their headquarters near the vineyard. The birds did not wait until the fruit was ripe the acidity of some of the varieties apparently suiting their taste. The varieties chosen were with thin skins, such as Canada, Brant, Peabody, Poughkeepsie and Delaware.

There were 90 varieties which ripened. As this was an unfavourable season for early ripening, it will be useful to record the names of those which ripened first, as these may be relied on to ripen almost every year.

Grapes which ripened earliest, 1905:—Florence, September 16, Champion, Manito, Early Daisy, September 18; Moore's Early, Early Ohio, September 20; Moyer, Golden Drop, Bonne Madame, Pattison, Campbell's Early, September 23; Janesville, Telegraph, Marion, Jewel, Canada, September 30. Brant and Peabody were nearly all eaten by birds, but they usually ripen about the same time as Canada.

The Lincoln (Read's hybrid) grape, which ripened early last year, did not ripen this year until after the above named varieties, but the vines are in a low part of the vineyard and the nights being cool ripening was delayed. This is a very promising sort, being a heavy bearer with uniform bunches and fruit of rather good quality.

Of grapes not yet described in this report the following is a rather promising variety for home use, being among the earliest:—

Early Daisy:—This variety was originated by John Kready, Mount Joy, Pa.

It was first planted at the Central Experimental Farm in the spring of 1901, has fruited for the past two seasons and has been one of the very earliest to ripen. Vine a medium grower and up to the present time rather a light bearer. Bunch small, moderately compact; fruit below medium size, round, black with a blue bloom; skin thick, tough; pulp firm; stones large; sweet but not high flavoured. Quality above medium. As early as Champion or earlier and much superior to it in quality. On account of its extreme earliness it should prove valuable for home use.

NEW BLACK CURRANTS.

In 1887, when Dr. Wm. Saunders, Director of the Dominion Experimental Farms, moved to Ottawa from London, Ont., he brought with him from his garden in London about 150 seedling black currants. These had been raised by Dr. Saunders from an extra fine seedling of a Black Naples seedling obtained by him from a former lot of seedlings grown in 1879. There are still growing at the Central Experimental Farm 28 of the best of those brought from London, and a few others originated at Ottawa. This number will be still further reduced in the next plantation. After eighteen years' experience with these currants, it is possible to form a good estimate of their relative value with other kinds now on the market. The following twelve varieties, which are given in order of productiveness, are practically all considered equal to any other named variety yet tested at Ottawa, and most of them are superior:—

Ogden:—Bush a medium to strong grower and the most productive black currant tested. Bunches medium to small. Fruit uneven in size, below to above medium; skin moderately thick, fairly tender; briskly subacid; quality medium; ripens unevenly. Season medium to late. Where great productiveness is desired and where size or quality is not important, this variety is recommended.

Saunders:—Bush a strong grower and very productive. Bunches medium size. Fruit above medium to large; skin thick; briskly subacid; quality medium. Season medium. One of the most promising commercial varieties. This is already offered for sale in Canada.

Kerry:—Bush a strong grower and very productive. Bunches medium to large. Fruit above medium to large; skin thick but tender; briskly subacid; quality above medium to good. Season medium to late. One of the most promising for commercial purposes on account of its great productiveness and good size of fruit.

Ontario:—Bush a strong grower and very productive. Bunches medium size. Fruit medium to above medium in size; skin moderately thick, tender; briskly subacid; quality medium to good. Ripens evenly. Season medium. Promising on account of productiveness.

Eclipse:—Bush a medium to strong grower and productive. Bunches large. Fruit medium to large; skin moderately thick, fairly tender; subacid; quality good; ripens evenly. Season early. Promising on account of productiveness, size and quality.

Magnus:—Bush a strong grower and very productive. Clusters medium in size. Fruit large; skin rather thick; subacid, good flavour; quality good. Season medium. Promising on account of productiveness, size of fruit and quality.

Ethel:—Bush a strong grower and productive. Bunches large. Fruit above medium size; skin rather thick; briskly subacid. Quality above medium. Fruit ripens evenly. Season medium. Promising on account of productiveness and size of fruit.

Climax:—Bush a strong grower and productive. Bunches large. Fruit above medium to large. Skin moderately thick, fairly tender, briskly subacid, good flavour; quality good. Season medium late. One of the most promising.

Success:—Bush a medium grower, but productive. Bunches medium size. Fruit large; skin moderately thick, tender, subacid, good flavour; quality good to very good. Ripens evenly. Season very early. Promising on account of earliness, size of fruit and quality.

Clipper:—Bush a strong grower and productive. Bunches large. Fruit medium to large; skin moderately thick, tender; briskly subacid, good flavour. Quality good. Fruit ripens somewhat unevenly. Season medium late. Promising.

Winona:—Bush a medium grower, productive. Bunches small to medium. Fruit above medium to large; subacid; quality good. Ripens evenly. Season early.

Topsy:—Bush a strong grower, moderately productive. Bunches large. Fruit above medium to large; clings well. Skin rather thick; briskly subacid; good flavour; quality good to very good. Season medium. This originated as a hybrid between Dempsey's Black Currant and a cross-bred gooseberry (Houghton X. Broom Girl). From this cross five plants grew. Of these, four had gooseberry foliage and one, the Topsy, black currant foliage and fruit.

RASPBERRIES.

The raspberry canes were bent down in the autumn of 1904 for protection as usual and came through the winter, in most cases, in fine condition. The crop of fruit was good this year.

Of all the varieties under test, the Herbert, a seedling originated by Mr. R. B. Whyte, Ottawa, Ont., is decidedly the best for this district. This variety has already been referred to and described in the previous reports, but a few more words may be said of it here. It is hardy, vigorous and very productive. The fruit is of the largest size and of good colour, and good quality. It is not quite as firm as Cuthbert, but in every other respect is superior to that variety at Ottawa. The Herbert is now for sale in Canada and the United States.

STRAWBERRIES.

There were 203 named varieties of strawberries under test this year. The crop, on the whole, was a medium one, but not so large as in some seasons, the plants of most varieties not having made many runners in 1904, when the plantation was made, and there being some injury from winter. In the variety tests a plantation is usually left to fruit for two seasons, as when the plants are not set very early in the spring the crop, the first year after planting, is not so large as the second. For commercial planting, however, it usually pays best to set the plants as early in the spring as possible, leaving a long season for making runners and taking only one crop from a plantation, as when many runners are made the plants become crowded the second year and the fruit is often small.

In the following table will be found a list of the fifty varieties which have given the best average yield in a test of from two to five years. Of these the Sample, Buster, Bisel, Glen Mary, Greenville, Beder Wood, Marie, Warfield, Enhance Barton's Eclipse, Thompson's Late, Dora, Daisy, Howard's 41, and Splendid, are among the most satisfactory, taking into consideration other qualities as well as yield. In addition to the above, Bubach and Lovett are two excellent varieties for home use, and Williams is one of the best for long distance shipment, although the Pocomoke, a firm newer variety, has yielded better and may take its place. The Early Beauty is a promising new early variety. The Afton, Daniel Boone and Stevens' Early, which have averaged a little better than Warfield in yield, are almost, if not quite, identical with the latter variety.

Average Rank.	Number of years averaged.	Rank, 1905.	Name.		Date of full bloom, 1905.	Date of first ripe fruit, 1905.	Date of first picking, 1905.	Date of last picking, 1905.	Number of pickings, 1905.	Weight of 25 average berries, 1905.	Total yield, 1905.	Average total yield.
										Oz.	Lbs. Oz.	Lbs. Oz.
1	2	1	Pocomoke	B..	June 6	June 24	June 27	July 14	7	7	23 4	22 11
2	5	15	Sample	P..	" 5	" 26	" 27	" 18	8	7	15 3	21 5
3	5	42	Bisel	P..	" 5	" 27	" 29	" 18	7	6¾	10 4½	19 7¼
4	5	73	Buster	P..	" 7	" 26	" 27	" 14	7	7¼	7 14¼	19 5
5	4	190	Mele	P..	" 7	" 27	" 29	" 14	5	6¼	2 1	19 2¼
6	5	34	Glen Mary	B..	" 5	" 26	" 29	" 18	8	7½	11 2¼	18 15
7	5	19	Greenville	P..	" 5	" 24	" 27	" 14	7	7	13 0	18 13
8	5	18	Daniel Boone	P..	" 2	" 21	" 24	" 14	8	5	13 3¾	18 10¼
9	5	65	Stevens' Early	P..	" 5	" 21	" 24	" 14	9	5	8 8½	18 6⅓
10	5	161	Afton	P..	" 5	" 24	" 27	" 11	6	5	3 2	17 13⅓
11	2	14	Splendid	B..	" 5	" 24	" 27	" 18	8	6½	15 4¼	17 1¼
12	5	121	Daisy	P..	" 5	" 24	" 27	" 14	7	6½	4 15½	17 8
13	5	9	Maggie	P..	" 5	" 24	" 27	" 14	7	6	16 11	17 3½
14	5	16	Dora	P..	" 7	" 23	" 24	" 14	8	6⅓	15 2	16 15⅔
15	5	20	Carleton	P..	" 5	" 21	" 24	" 18	10	6½	12 11¾	16 14⅓
16	5	123	Howard's 41	P..	" 7	" 26	" 27	" 14	7	6	4 14	16 12½
17	5	182	Enhance	B..	" 5	" 24	" 27	" 11	6	6	2 6½	16 1
18	5	3	Carrie	P..	" 8	" 29	" 30	" 18	6	7	18 9	16 1
19	5	146	Warfield, No. 2	P..	" 2	" 23	" 27	" 14	7	5¾	3 15	15 12⅕
20	5	72	Thompson's Late	P..	" 5	" 27	July 3	" 18	6	5½	7 14½	15 8⅗
21	5	129	Beder Wood	B..	" 2	" 23	June 24	" 11	8	5	4 13	15 7½
22	2	17	Early Beauty	B..	" 2	" 19	" 24	" 14	6	4¾	7 8⅕	15 6⅖
23	4	88	Cole's Seedling	B..	" 8	" 28	" 30	" 18	7	6½	6 15⅕	15 2
24	2	58	Lyon	P..	" 8	" 25	" 27	" 14	7	6⅕	9 2⅕	15 0
25	5	183	Barton's Eclipse	P..	" 5	" 28	" 29	" 11	5	6¼	2 6¼	14 12
26	5	101	Swindle	P..	" 2	" 26	" 27	" 18	8	6	6 5	14 11
27	5	67	John Little	P..	" 5	" 23	" 24	" 14	9	5	8 3½	14 11
28	5	70	Wonderful	P..	" 5	" 23	" 24	" 11	7	6	8 0	14 8⅕
29	5	93	No Name	B..	" 5	" 23	" 24	" 11	7	6¼	6 9⅕	14 8¼
30	5	115	Bubach	P..	" 5	" 24	" 27	" 14	7	7¼	5 5⅕	14 8
31	5	48	Parker Earle	B..	" 2	" 24	" 27	" 18	9	6⅕	10 0¾	14 6
32	5	81	Williams	B..	" 8	" 27	" 27	" 14	7	6⅕	7 5⅕	14 2¾
33	3	107	Marie	P..	" 5	" 28	" 29	" 14	6	7⅕	5 15¾	14 2¼
34	5	86	Clyde	B..	" 5	" 26	" 27	" 18	8	6⅕	7 0	14 0¼
35	5	28	Tennessee Prolific	B..	" 5	" 24	" 27	" 18	8	6½	12 1¼	13 15¼
36	5	98	Arkansas Traveller	B..	" 7	" 26	" 27	" 14	7	6	6 6	13 13
37	5	155	Crescent	P..	" 2	" 25	" 27	" 14	7	5	3 6	13 12
38	5	87	G. H. Caughell	B..	" 2	" 21	" 24	" 14	7	5¾	6 15¾	13 5¼
39	2	5	Big Bobs	B..	" 5	" 26	" 29	" 18	8	8	18 1⅕	13 1⅗
40	5	137	Bomba	P..	" 5	" 26	" 27	" 14	8	5½	4 7⅗	13 1
41	5	6	Mrs. Cleveland	P..	" 7	" 25	" 27	" 18	8	7	16 15¾	13 1
42	3	4	Kansas	P..	" 8	" 27	" 29	" 18	8	6¾	18 6	12 15
43	5	179	World's Champion	B..	" 7	" 26	" 27	" 14	7	5	2 7¼	12 9⅕
44	2	24	Success	B..	" 5	" 26	" 27	" 14	7	6⅕	12 6	12 9½
45	5	133	Dr. Arp	P..	" 5	" 25	" 27	" 14	7	6	4 9	12 9
46	5	23	Morgan's Favorite	B..	" 5	" 25	" 27	" 18	8	7¾	12 8	12 7
47	5	22	Princess	P..	" 5	" 21	" 24	" 18	10	5½	12 8	12 7
48	5	47	Boynton	P..	" 5	" 23	" 24	" 14	9	5	10 1½	12 6
49	5	108	Kyle	B..	" 4	" 25	" 27	" 14	8	6¼	5 15	11 14½
50	5	95	Hood River	P..	" 5	" 24	" 27	" 14	7	7	6 8	11 13

COVER CROPS.

In recent years the English horse bean has proven valuable as a cover crop for holding the snow in winter as it is tall and does not break down much, but as no seed could be obtained it was not used this year. It was planned to grow horse beans and rape together this year as a cover crop, the former principally to hold the snow, and the latter for a bottom cover. As horse beans could not be obtained, rape was sown broadcast alone in part of the orchard on July 28, at the rate of 8 lbs. per acre, and when winter set in averaged 17 inches in height. It formed a dense cover, killing out practically all the weeds. Owing to the height to which it grew it should hold the snow well, and as leguminous crops have been used for the past nine years there should be sufficient nitrogen in the soil for some time. In another part of the orchard Hairy vetch, which had proven a very good cover crop, was sown in drills 28 inches apart on July 15. By winter it had made a perfect mat in most places, but had not made a strong enough growth to hold the snow well. The most satisfactory results are obtained from Hairy Vetch sown in drills when the seed is sown about the middle of June.

Work in determining the amount of moisture which different cover crops take from the soil was continued in the orchard this year by Mr. Frank T. Shutt, Chemist.

FUNGOUS DISEASES.

The Apple Spot fungus was not as bad as usual this year in most districts, but here and there it was very bad. In the orchards of the Experimental Farm, where spraying with Bordeaux mixture has been carried on regularly for the past thirteen or fourteen years, there is never any trouble with this disease, it being a rare sight to see any fruit spotted except among seedling trees which are not sprayed regularly; while there is good evidence to show that if the orchard trees were not sprayed the disease would soon spread.

Ripe Rot, Brown Rot, of the Plum:—This is one of the most difficult diseases to control. At the Central Experimental Farm it did considerable injury to Americana plums this year, notwithstanding thorough spraying. As this disease spreads by means of spores which germinate early in the spring and penetrate the twigs from the leaves and flower buds on which they alight, all the diseased plums which harbour myriads of these spores should be destroyed in the fall if practicable, but as this often cannot be done it will be seen how important it is to thoroughly spray the trees early in the spring before the spores, which are carried from this diseased fruit, germinate. The first spraying should be made shortly before the buds break with poisoned Bordeaux mixture or a sulphate of copper solution in the proportion of 1 lb. sulphate of copper to 25 gallons of water. A second spraying should be made with poisoned Bordeaux just before the blossoms open. These are two of the most important sprayings. The trees should be thoroughly sprayed again after blooming with poisoned Bordeaux, and again about two weeks before the fruit begins to colour. When the fruit begins to ripen they may be sprayed with the ammoniacal copper carbonate, which will not discolour the fruit, and which should destroy many of the spores which appear in great numbers on the mature fruit. As the disease spreads much more rapidly from fruit to fruit when they are touching each other, thinning is a good practice if for no other reason than to reduce this disease. Thorough spraying and thinning will lessen the injury from this disease very much.

Black Rot of the Grape:—While the black rot of the grape was not nearly so destructive this year as in 1904, and hence the results of spraying not so apparent, fruit growers should not neglect to spray their vineyards next year, as the disease

may cause even greater loss than it did in 1904. The first spraying should be made with Bordeaux mixture just before blossoming; the second just after the fruit has set, and the third and fourth at intervals of about a week. There should then be three sprayings with ammoniacal copper carbonate.

SPRAYING AND SPRAYING MIXTURES.

The practice of spraying crops for the prevention of fungous diseases and insect pests is not growing in popularity as rapidly as the good results obtained would warrant, and notwithstanding the fact that year after year the advantages of spraying are impressed upon Canadian fruit growers from many sources. Spraying at the best, however, is an unpleasant operation and when the results are not always so apparent as killing potato beetles with Paris green, fruit growers are liable to get discouraged and decide to let spraying alone and take their chances. No greater mistake could be made. The good results from spraying to prevent injury from fungous diseases and injurious insects have been so frequently proven that spraying should be carried on by every fruit grower, just as he cultivates his field, in faith that good will result. Some years the results are not so pronounced as in others, but spraying is an insurance and the average results will well compensate for all the trouble and expense incurred. Thoroughness in spraying is, however, essential. A spraying calendar was published at the Central Experimental Farm this year which will be sent free to any one applying for it. This calendar gives information as to the time of spraying for the various diseases and insect pests affecting orchard and garden crops, and the formulas for preparing the different fungicides and insecticides recommended, and this will be found most useful for reference.

SODA BORDEAUX (BURGUNDY MIXTURE).

The Soda Bordeaux, or Burgundy Mixture as it is known in Great Britain, is made with carbonate of soda or washing soda instead of lime for neutralizing the sulphate of copper. Owing to the difficulty of getting lime in many places in the country, and because of the occasional clogging of nozzles by the lime when it has not been properly slacked or strained, considerable attention has been given in Canada of late to the Soda Bordeaux. Moreover, the experience of those who have used it in large quantities in the old country for several years for spraying potatoes is that if it is applied when freshly made it will adhere better than ordinary Bordeaux. At least one, and perhaps several Ontario fruit growers have been using the Soda Bordeaux successfully for several years in spraying apple trees for the prevention of Apple Spot fungus. It does not discolour the fruit as much as ordinary Bordeaux and is liked on this account.

It is not, however, recommended instead of Bordeaux mixture for spraying fruit trees, as sufficient evidence has not yet been obtained of its relative value.

During the past season several Canadian fruit growers used the Soda Bordeaux for the first time and with it Paris Green. Considerable injury to foliage resulted. The cause of this injury is explained by Mr. F. T. Shutt, Chemist, Experimental Farms, in the August number of the Canadian Horticulturist, where he writes:— 'When Paris green is mixed with ordinary Bordeaux it is not dissolved, but remains in suspension and experience has shown that no injury results from the use of such a spray. When, however, Paris green is added to Burgundy mixture it is partly dissolved by the excess of washing soda used in the preparation of the spray and a soluble arsenical compound formed which is more or less corrosive to foliage. It has long been known that soluble arsenical compounds have this injurious effect upon foliage, and consequently cannot be used in insecticidal mixtures.' In some experiments conducted by Mr. Shutt at the Central Experimental Farm, the details of which will be found in his annual report for this year, it was shown that injury to foliage resulted when arsenical poisons were

used with the Burgundy mixture. It will, therefore, be readily seen that no arsenical poison should be used with Burgundy mixture for fruit trees.

In some potato experiments conducted during the past year we have not noticed any injury to the vines from the use of Paris green with the Burgundy mixture, although slight injury not detected, may have occurred. The formula for Soda Bordeaux mixture was published in the report of the Horticulturist for 1902. The following formula has been used with success for spraying potatoes for the prevention of blight and rot, although the results were not quite as good as with ordinary Bordeaux. The details of the results will be found among the potato experiments in this report.

SODA BORDEAUX (BURGUNDY MIXTURE) FOR POTATO BLLIGHT AND ROT.

Copper sulphate (bluestone).....	6 lbs.
Washing soda (carbonate of soda)....	7½ lbs.
Water (1 barrel)....	40 gallons.

Dissolve copper sulphate as for Bordeaux mixture. Dissolve washing soda in about 4 gallons of water. Pour the copper sulphate solution into a barrel, half fill the barrel with water, then stir in the solution of washing soda, and finally fill the barrel with water. It is now ready for use. The Soda Bordeaux adheres better to the foliage when freshly made than the ordinary Bordeaux mixture, but it deteriorates rapidly in this respect and must be used as soon as made. If left to stand for twenty-four hours it will have lost nearly all its adhesiveness. The Soda Bordeaux is not recommended in preference to the ordinary Bordeaux mixture, but where lime cannot be obtained it may be used with good results. Furthermore, on account of its freedom from gritty matter, there is less likelihood of the nozzles becoming clogged when it is used. As washing soda is considerably more expensive than lime, this mixture costs more than the ordinary Bordeaux mixture. If Soda Bordeaux is used for fruit trees it should be made in the proportion of copper sulphate, 4 lbs.; washing soda, 5 lbs., water (1 barrel), 40 gallons, but no arsenical poison should be used with it.

NEW FORMULAS FOR KEROSENE EMULSION.

Kerosene emulsion has for a number of years been one of the best remedies for sucking insects, but as it is somewhat troublesome to make, efforts have been made from time to time to find some other way in which kerosene could be safely used as an insecticide. As kerosene does not mix with water it is necessary to apply it in the form of an emulsion in order that it may be well distributed, and thus not cause injury to the tree.

In 1904 Prof. Close, of the Delaware Experiment Station, discovered that lime could be used instead of soap as an emulsifying agent. By mixing 1 lb. of limoid, or slaked lime, with 1 quart of kerosene and then diluting with water to the percentage desired and churning for five minutes by means of the liquid pumped through a coarse nozzle, an emulsion was formed which kept the kerosene in suspension for several weeks. He called this mixture the K-L Mixture, from the initial letters of kerosene and limoid. Limoid is a very fine preparation of lime manufactured in the United States and not obtainable in Canada. In order to learn if good lime, well slaked would not answer the same purpose, several experiments were planned and carried out in the chemical laboratory at the Central Experimental Farm in conjunction with Mr. F. T. Shutt, Chemist. The following results were obtained:—

1. Freshly slaked lime makes a smoother emulsion and one that stays in suspension longer than one made with ordinary air slaked lime; the latter, however, furnishes a satisfactory emulsion if it is not too much carbonated by long exposure to the air.

2. By using lime slaked immediately before mixing the quantity may be materially reduced. A perfect emulsion can be made by slaking ½ lb. of good quick lime and emulsifying with 1 quart of kerosene and 2 gallons of water.

A further advantage in using freshly slaked lime for orchard purposes lies in the fact that it more thoroughly whitens the trees than the emulsion made with the air-slaked lime. This enables the operator the easier to observe the degree of thoroughness with which the spraying is done.

3. By the use of freshly slaked lime less time is needed for the churning in order to bring the mass to a perfect emulsion. From three to five minutes will be found sufficient to make the emulsion.

4. It is not apparently a matter of much moment that the lime be dry and powdery when mixed with the kerosene. Excellent emulsions have been made both from the air-slaked and freshly slaked lime when they have been quite moist or even made into a thin cream with water before adding the kerosene.

FLOUR EMULSION.

While conducting the experiments already referred to, it was discovered by Mr. Shutt that flour could be successfully substituted for lime. It was found by experiment that 8 ounces of flour was sufficient to hold in suspension 1 quart of kerosene, and even 2 ounces would make a temporary emulsion for immediate use. If the flour were scalded before adding the kerosene 2 ounces were found sufficient to make an emulsion which would stay up for more than a week. The operation of making kerosene emulsion with flour is very simple. The kerosene is first poured into a dry pail or barrel, the flour is then added and the two stirred together. Water is now added to make the desired percentage and the emulsion is then made by churning vigorously for about four or five minutes. If made in the proportion of 1 quart kerosene to 2 gallons of water the emulsion will contain about 11 per cent of kerosene, which is a safe amount to use for most plants in summer. The flour emulsion is smooth, readily and easily atomized, and does not clog the nozzle. Although no free kerosene will appear for several days at least, any separation into layers may be readily overcome or remedied by simply stirring the mixture.

When the flour emulsion is used there is no noticeable whitening of the tree or foliage, which is an advantage where ornamental shrubs are to be treated and where the whitening of the foliage is objectionable, but this is a disadvantage, however, in spraying fruit trees where the thoroughness of the work is of prime importance, as when the flour emulsion is used one cannot so readily see if the work has been well done. The chief advantages of the flour emulsion are that it is easily made, and also can be used when good lime cannot be obtained. This flour emulsion may be added to Bordeaux mixture, and Bordeaux mixture and Paris green if desired.

Experiments conducted at the Central Experimental Farm this year to test the effect of the lime and flour kerosene emulsions were not conclusive, but the indications are that these emulsions are not so effective as the ordinary kerosene emulsion made with soap, the soap evidently playing an important part in the destruction of sucking insects.

In reply to a letter addressed to Mr. E. D. Smith, M.P., who had used the Kerosene Emulsion made with flour in fighting aphis on his nursery stock in 1905, the following letter was received:—

DEAR SIR,—Yours to hand in regard to the kerosene emulsion with flour. It worked very well. We had no trouble when it was thoroughly agitated. We had no damage from the use of it, as we have had in previous years when made in the old way.

Yours truly,

E. D. SMITH.

VEGETABLES.

FARMERS' LIST OF BEST VEGETABLES.

The results of variety tests of vegetables for the past eighteen years are summarized in the following table, where a list is given of the varieties of each kind of vegetable which are considered the best to plant:

Asparagus.—Conover's Colossal is the best all round variety, but this is more subject to rust than Palmetto or Argenteuil.

Beans.—Keeney's Rustless Golden Wax or Wardwell's Kidney Wax, for early crop; Early Refugee, for medium; and Refugee or 1,000 to 1, for late crop, are the most satisfactory dwarf varieties. Asparagus, Lazy Wife and Old Homestead are three of the best pole varieties.

Beets.—Egyptian Turnip, Meteor and Eclipse are three of the best.

Borecole or Kale.—Dwarf Green Curled Scotch is the best.

Broccoli.—White Cape.

Brussels Sprouts.—Improved Dwarf is the most satisfactory.

Cabbage.—Early Jersey Wakefield (early), Succession (medium), Late Flat Dutch, Houser, Drumhead Savoy (late), Red Dutch (red), is a select list of the best varieties of cabbage. For extra early use, Paris Market is desirable, being a week earlier than Early Jersey Wakefield.

Cauliflowers.—Early Dwarf Erfurt and Early Snowball.

Carrots.—Chantenay is one of the best, but if a good extra early sort is required the Early Scarlet Horn can be planted with advantage. It is a small variety.

Celery.—Golden Self-Blanching (Paris Golden Yellow), Improved White Plume (early), Perfection Heartwell, White Triumph, London Red (late) are among the best.

Corn.—Early Fordhook, Early Cory (early), Crosby's Early, Golden Bantam, Henderson's Metropolitan (second early), Perry's Hybrid, Stabler's Early, Early Evergreen, and Black Mexican (medium), Stowel's Evergreen, Country Gentleman (late). In planting, the Country Gentleman should not be omitted, as it lengthens the season very considerably and is of fine quality.

Cucumbers.—Peerless White Spine or White Spine, Cool and Crisp, and Giant Pera are three of the most satisfactory slicing varieties. Boston Pickling is a good pickling sort.

Egg Plant.—New York improved and Long Purple succeed best.

Lettuce.—Black Seeded Simpson, The Morse, (early curled); New York, Giant Crystal Head, Crisp as Ice, and Improved Hanson (curled cabbage); Improved Salamandar, Tennis Ball (cabbage); Trianon and Paris (Cos lettuce).

Melons, Musk.—Long Island Beauty, Hackensack and Montreal Market, of the Nutmeg type; Surprise, Christiana and Emerald Gem, of the yellow fleshed types, are all good.

Melons, Water.—Cole's Early, Salzer's Earliest, Ice Cream, Phinney's Early are good early water melons.

Onions.—Yellow Globe Danvers and Large Red Wethersfield are two of the best onions in cultivation.

Parsnips.—Hollow Crown and Dobbie's Selected are both good sorts.

Parsley.—Doubled Curled is as good as any.

Peppers.—Cayenne, Chili and Cardinal, are three of the best.

Pease.—Gregory's Surprise, Thos. Laxton, Gradus, American Wonder, Premium Gem (early); McLean's Advancer, Nott's New Perfection, Heroine (medium). None of these are tall growing varieties. Stratagem, Juno (dwarf), Telephone (late). Excelsior is a promising second early sort.

Potatoes.—Extra early; Rochester Rose, Early Ohio, Early Andes (pink), Bovee, Burpee's Extra Early (pink and white), Snowball and Eureka Extra Early, (white); early; Early White Prize (white), Vick's Extra Early (pink and white). Main crop; Carman No. 1 (white), Money Maker (white), Burnaby Mammoth (pink and white), Late Puritan (white), Dreer's Standard (white).

Radishes.—Early; Scarlet White-tipped Turnip, Rosy Gem, French Breakfast, Red Rocket (red); Icicle (white); late: White Strasburg, Long White Vienna; winter: Long Black Spanish, Chinese Rose-coloured.

Rhubarb.—Linnaeus, Victoria.

Salsify.—Long White, Sandwich Island.

Spinach.—Victoria, Thickleaved.

Squash.—Early: White Bush Scalloped, Summer Crook Neck; late: Hubbard.

Tomatoes.—Early; Sparks' Earliana, Chalk's Early Jewel; Main crop: Brinton's Best, Trophy, Matchless (scarlet), Burpee's Climax, Autocrat (purplish pink).

There are many varieties of tomatoes which are almost equal in excellence and productiveness.

Turnips.—Early; Extra Early Milan, Red Top Strap Leaf.

Swedes.—Champion Purple Top, Skirving's Improved.

POTATOES.

Although the potato crop in some parts of the provinces of Ontario and Quebec was much reduced this year owing to Blight and Rot, the yields in the experimental plots were good, and there was little rot there. The thorough spraying with Bordeaux mixture which the vines received was undoubtedly the cause of such good results in an unfavourable season. In the uniform test plots the highest yield was obtained from the Dalmeny Beauty, a variety obtained from Scotland in 1904, which yielded at the rate of 475 bushels 12 lbs. per acre this year. This is an exception to most varieties from Great Britain, which usually give comparatively poor results here.

The potatoes were planted in good sandy loam soil on May 22. The previous crop was tobacco, which had been well manured. The soil was ploughed in the autumn and again in the spring after which it was disc harrowed twice, and harrowed once with the smoothing harrow. The drills were made 30 inches apart and about 4 inches deep with the double mould board plough. The sets, which had at least three good eyes, were dropped one foot apart in the drills. Sixty-six sets of each kind were planted and covered with the hoe. The land was harrowed before the potatoes appeared above ground in order to kill weeds, and then kept thoroughly cultivated as long as possible. Practically, level cultivation was practiced, although the soil was drawn slightly towards the plants. The vines were sprayed with Bordeaux mixture five times and with Paris green when necessary. The potatoes were dug on October 5. Last year new seed of the Carman No. 1 and Carman No. 3 potatoes were obtained from the introducers, J. M. Thorburn & Co., Philadelphia, to compare the yield with those from seed which had been grown at the Central Experimental Farm for the past nine seasons. The difference in yield last year in favour of the new seed of Carman No. 1, was at the rate of 66 bushels 36 lbs. per acre, and of Carman No. 3, 171 bushels 36 lbs. The crop from these strains was kept separate and planted again this year with somewhat similar results, the new seed of Carman No. 1 yielding at the rate of 92 bushels 24 lbs. more, and of Carman No. 3 at the rate of 66 bushels more per acre than the Experimental Farm seed. These results are very marked and indicate the benefits which are at least sometimes derived from a change of seed.

Potatoes—Test of Varieties.

Number.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre, Marketable.		Yield per Acre, Unmarketable.		Colour.
	Medium and Late Varieties.		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Dalmeny Beauty	Good	475	12	426	48	48	24	White.
2	Rural Blush	"	462	..	431	12	30	48	Pink.
3	Ashleaf Kidney	"	435	36	396	..	39	36	White.
4	Manistee	Med. to g.	422	24	374	..	48	24	Bright pink.
5	Norcross	Good	418	..	391	36	26	24	White.
6	Carman No. 1 (New Seed, 1904)	"	413	36	369	36	44	..	"
7	Sabean's Elephant	"	404	48	360	48	44	..	"
8	Canadian Beauty	"	396	..	374	..	22	..	Pink and white.
9	I. X. L	"	396	..	3 5	12	30	48	"
10	Pearce	"	391	36	347	36	44	..	"
11	Ionia	Medium	382	48	347	36	35	12	White.
12	Clay Rose	"	378	24	334	24	44	..	Pink.
13	Morgan's Seedling	Good	374	..	343	12	30	48	Pink and white.
14	Empire State	"	369	36	338	48	30	48	White.
15	American Wonder	"	369	36	330	..	39	36	"
16	Seedling No. 7	Med. to p.	365	12	334	24	30	48	Bright pink.
17	Morgan's White	Medium	365	12	308	..	57	12	White.
18	Holborn Abundance	"	360	48	316	48	44	..	"
19	Dooley	Good	356	24	325	36	30	48	"
20	Delaware	"	356	24	316	48	39	36	"
21	Vermont Gold Coin	"	347	36	308	..	39	36	"
22	Carman No. 3 (New Seed, 1904)	"	343	12	325	36	17	36	"
23	Enormous	"	343	12	303	36	39	36	"
24	Dreer's Standard	"	334	24	308	..	26	24	"
25	Late Puritan	"	330	..	308	..	22	..	"
26	Uncle Sam	"	321	12	290	24	30	48	"
27	Carman No. 1	"	321	12	286	..	35	12	"
28	State of Maine	"	316	48	281	36	35	12	"
29	Burnaby Mammoth	"	316	48	272	48	44	..	Pink and white.
30	Empress Queen		308	..	228	48	79	12	
31	Money Maker	Good	299	12	228	48	70	24	White.
32	Rose No. 9.	Medium	294	48	272	48	22	..	Pink.
33	Swiss Snowflake	Good	286	..	250	48	35	12	White.
34	American Giant	"	281	36	242	..	39	36	"
35	Doherty's Seedling	"	277	12	264	..	13	12	"
36	Carman No. 3	"	277	12	255	12	22	..	"
37	Vick's No. 9		277	12	242	..	35	12	"
38	White Albino	Good	277	12	224	24	52	48	"
39	Charles Fidler	"	272	48	246	24	26	24	"
40	Mammoth Pearl	"	264	..	250	48	13	12	"
41	Dr. Maerker	Medium	255	12	154	..	101	12	"
42	Cambridge Russet	Good	228	48	206	48	22	..	"
43	Evergood		228	48	162	48	66	..	"
44	Northern Star		224	24	154	..	70	24	"
45	Jubilee	Good	198	..	171	36	26	24	Pink and white.
46	Hibernia		193	36	110	..	83	36	Deep pink.
47	Malden's Recorder		17	36			17	36	White

Potatoes—Test of Varieties.

Number.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre, Marketable.		Yield per Acre, Unmarketable.		Colour.
	Early Varieties.		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Maule's Thoroughbred	Good	396	..	360	48	35	12	Pink.
2	Country Gentleman	"	382	48	347	36	35	12	" and white.
3	Crine's Lightning	"	374	..	347	36	26	24	Red.
4	Rochester Rose	"	352	..	303	36	48	24	Pink.
5	Reeve's Rose	"	343	12	308	..	35	12	"
6	Vick's Extra Early	"	338	48	312	24	26	24	" and white.
7	Early Carter	"	321	12	290	24	30	48	White.
8	Early Rose	"	294	48	259	36	35	12	Pink.
9	Clarke's Pride	"	290	24	242	..	48	24	White.
10	Everett	"	290	24	242	..	48	24	Pink.
11	Irish Cobbler	"	290	24	242	..	48	24	White.
12	Daybreak		290	24	233	12	57	12	Pink.
13	Quick Crop	Good	286	..	250	48	35	12	" and white.
14	Rawdon Rose		281	36	255	12	26	24	" "
15	Penn Manor	Good	281	36	250	48	30	48	" "
16	Early White Prize	"	272	48	242	..	30	48	" "
17	Peck's Early		268	24	242	..	26	24	Pink.
18	Pingree		268	24	220	..	48	24	White.
19	Early Sunlight		268	24	215	36	52	48	"
20	Northern Beauty		264	..	228	48	35	12	Pink.
21	Early Johnston		259	36	224	24	35	12	Pale pink.
22	Bovee	Good	250	48	176	..	74	48	Pink and white.
23	Early Elkinah	"	246	24	224	24	22	..	Pink.
24	Early Ohio	"	246	24	220	..	26	24	"
25	Early Andes	"	246	24	220	..	26	24	"
26	Eureka Extra Early	"	242	..	176	..	66	..	White.
27	Snowball	"	224	24	198	..	26	24	"
28	Early Superior		211	12	162	48	48	24	Pink.
29	Early St. George	Good	198	..	162	48	35	12	" and white.
30	Burpee's Extra Early	"	176	..	132	..	44	..	" "
31	Early Envoy		162	48	132	..	30	48	" "
32	Van Orman's Earliest		114	24	83	36	30	48	Bright pink.

Twelve best Yielding Potatoes—Average of Five Years, 1901-05.

Number.	Name of Variety.	Number of Years under Test.	Season.	Colour.	Quality.	Average Yield per Acre, 1901 to 1905.	
						Bush.	Lbs.
1	Dr. Maerker	7	Very late	White	Medium to good.	456	43
2	Late Puritan	12	Late	"	Good	452	46
3	Carman No. 1	11	Medium late	"	"	447	55
4	Money Maker	11	Medium	"	"	439	7
5	Rural Blush	17	Late	Pink and reddish	"	438	14
6	Dreer's Standard	12	"	White	"	434	17
7	*Burnaby Mammoth	13	Medium	Pink and white	"	427	41
8	Pearce	6	"	" "	"	425	2
9	I. X. L	13	"	" "	"	422	50
10	Canadian Beauty	8	"	" "	"	422	24
11	Clay Rose	11	Late	Deep pink	Medium	420	38
12	Sabean's Elephant	11	"	White	Good	418	..

* This variety was first grown under the name of Burnaby Seedling, and then procured under the name of Burnaby Mammoth. The average yield given is from the new strain for two years, and the old one for three years.

Smaller plots of polatoes.—This year a much larger number of varieties than usual was tested for the first time. A number of these was imported from Great Britain, but in most cases those from this source did not yield nearly as well as those

from Canada or the United States. Our season is apparently too short for most of the varieties from Great Britain. Some of the new varieties were tested in the uniform test plots, but the following 44 sorts were grown in smaller plots. Of these, three were new strains of old varieties obtained from the Ontario Agricultural College, Guelph.

POTATOES—YIELDS FROM SMALLER PLOTS.

Number.	Name of Variety.	Number of Sets Planted.	Total Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.	
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Harris Snowball	8	562	39	544	30	18	9
2	Snider Best Early	8	544	30	490	3	54	27
3	L. A. Sovereign, Round Plains, Man	4	508	12	471	54	36	18
4	Merrill	8	526	21	508	12	18	9
5	Early Pride	33	475	12	378	24	96	48
6	Hard to Beat	16	471	53	381	9	90	45
7	Potentate	16	453	45	381	9	72	36
8	Early May	16	435	36	363	..	72	36
9	Woltman	33	431	12	352	..	79	12
10	Star of the East	8	417	27	399	18	18	9
11	Fantail Rose	33	413	36	343	12	70	24
12	Pearl of Savoy (O.A.C.)	16	381	9	344	51	36	18
13	Empire State (O.A.C.)	16	381	8	299	28	81	48
14	Wee MacGregor	33	378	24	343	12	35	12
15	White Mammoth	16	363	..	308	33	54	27
16	Early Trumbull	16	363	..	326	42	36	18
17	Early Bird	8	363	..	326	42	36	18
18	Uncle Gideon's Quick Lunch	8	363	..	290	24	72	36
19	Naught Six	16	363	..	272	15	90	45
20	Early Excelsior	16	353	55	335	46	18	9
21	Washington	16	353	55	317	37	36	18
22	Noroton Beauty	8	326	42	290	24	36	18
23	Million Dollar	16	326	41	317	37	9	4
24	American Wonder (O.A.C.)	16	326	32	299	19	27	13
25	New Reliance	16	317	37	254	6	63	31
26	Standard	16	299	28	245	1	54	27
27	Burpee's Extra Early (Burpee)	33	295	12	246	24	52	48
28	Babbit	8	290	24	217	48	72	36
29	New Climax	16	272	14	190	34	81	40
30	Canadian Red	16	271	45	235	27	36	18
31	Sutton's Sion House	16	254	6	199	39	54	27
32	Dewey	16	245	1	217	48	27	13
33	The Scot	12	242	..	193	36	48	24
34	Duke of York	16	199	39	145	12	54	27
35	Early Hero	16	181	30	145	12	36	18
36	Vicktor	16	163	21	145	12	18	9
37	Peacemaker	16	163	21	127	3	36	18
38	Eightyfold	33	136	24	114	24	22	..
39	Ninetyfold	16	136	7	90	45	45	12
40	Snowdrop	33	114	24	70	24	44	..
41	Pride of Tonbridge	33	105	36	79	12	26	24
42	Sir John Llewellyn	33	88	..	61	36	26	24
43	Sharpe's Victor	33	70	24	..	..	70	24
44	Myatt's Ashleaf	33	52	48	..	..	52	48

POTATOES—TEST OF RESISTANCE TO BLIGHT.

An experiment was conducted this year to determine which varieties of potatoes were freest from blight, and which of those freest from blight would prove most productive. The potatoes were planted side by side on May 27 in sandy loam soil, 33 sets of each kind being used. The plants were sprayed with Paris green to protect them from the potato beetle, but no Bordeaux mixture was used. Level cultivation was adopted. The kinds planted were those which in previous years had shown themselves freest from blight, but a few less resistant varieties were used with the object of giving the disease a foothold. Thirty-two varieties were planted. The Holborn Abundance,

which has been grown at the Central Experimental Farm for the past seventeen years, proved to be the most blight resistant as well as one of the most productive. It yielded at the rate of 316 bushels 48 lbs. per acre. About equally as resistant to blight but much lower in yield were: June, 189 bushels 12 lbs. per acre; Rust Proof, 118 bushels 48 lbs. per acre; Sutton's Discovery, 66 bushels per acre. Almost equally resistant were Clay Rose, 215 bushels 36 lbs. per acre; Rural Blush, 206 bushels 48 lbs. per acre, and Dr. Maerker, 158 bushels 24 lbs. per acre, and State of Maine, 149 bushels 36 lbs. per acre. The dates when the tops showed the first signs of disease; when the leaves were dead; and when the stems were dead, were all noted and the yield per acre recorded of all the varieties tested.

The disease did eventually attack the foliage of those most resistant and as these are all late varieties some of them did not yield as much as other earlier kinds a little less resistant. The disease developed early this year, which accounts, no doubt, for the fact that the yields from some of the most blight resistant but latest varieties were comparatively small. It is evident that a variety can be so late in season that it will not resist blight long enough for a crop to be developed which will equal a variety a little earlier in season though apparently not so resistant. The potatoes from the best hills of the most blight resistant varieties were saved for the purpose of continuing this test in the hope that by careful selection more productive and more blight resistant strains will be developed.

Spraying Potatoes to Prevent Blight and Rot.—The prevalence of blight and rot in the provinces of Ontario and Quebec this year will, it is hoped, draw the attention of farmers more than it has done in the past to the value of Bordeaux mixture in preventing this disease. During the past fourteen years experiments have been conducted at the Central Experimental Farm with the object of testing different remedies, but up to the present time nothing has proven as satisfactory as Bordeaux mixture. An estimate of the cost of applying Bordeaux mixture has been given in previous reports and in a bulletin on potato culture published this year. Briefly stated, it may be said that the cost of four applications per acre was estimated at $5.52. As this estimate was based on comparatively small plots it would be somewhat reduced on large areas. As the disease may make its appearance any time during the latter part of July, it has been found to be the best practice to spray about the middle of July, or even before, if one has to spray for the potato beetle about that time. The formula recommended is: 6 lbs. bluestone, 4 lbs. lime, 40 gallons water.

Following are the results obtained from the use of Bordeaux mixture, including this year. It will be seen that the average increase from spraying for four years is at the rate of 92 bushels 31 lbs. per acre. At 40c. a bushel this would mean an average net profit per acre from the use of Bordeaux mixture of about $30, deducting the cost of application.

	1901.		1902.		1904.		1905.		1901-2-4-5.	
	Average yield per acre of Marketable Potatoes—Sprayed four times and unsprayed.		Average yield per acre of Marketable Potatoes—Sprayed four times and unsprayed.		Average yield per acre of Marketable Potatoes—Sprayed five times and unsprayed.		Average yield per acre of Marketable Potatoes—Sprayed five times and unsprayed.		Average yield per acre of Marketable Potatoes (Four Years)—Sprayed and unsprayed.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
Sprayed	333	43	310	12	369	21	228	4	310	20
Unsprayed	233	11	189	34	306	39	141	32	217	49
Average increase in yield per acre of Marketable Potatoes from spraying with Bordeaux mixture	100	32	120	18	62	42	86	32	92	31

POTATO SPRAYING EXPERIMENTS, 1905.

This year five comparative experiments were made, there being eighteen varieties in each test. The potatoes were planted on May 26, 33 sets of each variety being used. Level cultivation was adopted. The figures given are the averages of the eighteen kinds tested. This experiment was practically the same as was conducted in 1904, and in the report for that year fuller details are given regarding the different formulas and the relative cost of application. The Bordeaux mixture, Soda Bordeaux, and Bordeaux mixture and Bug Death were each applied five times. With the two first, Paris green was added when necessary. Where Bug Death alone was used it was applied twice dry and four times with water.

Average Yield per Acre Marketable Potatoes, 1905 (18 varieties).

	Bush.	*Lbs.*
Bordeaux mixture and Paris green	228	4
Soda Bordeaux and Paris green	211	27
Bordeaux mixture and Bug Death	182	7
Paris green only	141	32
Bug Death	107	33

TOMATOES—TEST OF VARIETIES.

The tomato is such a popular vegetable that it has received much attention in the horticultural department. Practically all the varieties which have been offered for sale have been tested during recent years, the greater part of which have now been discarded, although 54 sorts were tested this year.

The Bright and Early, which heads the list for productiveness this year, has nearly always been one of the most productive. It is, however, too small for commercial purposes, but where weight of crop is the chief consideration this should prove a very valuable variety. It is smooth, regular in shape and of an attractive scarlet colour, but is below medium to small in size. The main crop varieties, which have averaged best in productiveness in the past and which are of good shape, are: Brinton's Best, Trophy, and Matchless (scarlet); and Burpee's Climax and Autocrat (purplish pink). The Marvel, one of the newer scarlet main crop varieties, is a very fine sort.

Among early varieties, Sparks' Earliana continues to take first place. It is the earliest smooth scarlet tomato which has been tested. In the table containing the list of earliest varieties for 1905, it will be noticed that Sparks' Earliana (C.E.F.) gave by far the largest weight of early ripe fruit. This was from seed selected for the two previous years from the earliest ripening fruits of this variety at the Central Experimental Farm, and shows the importance of selecting and saving one's own seed when possible. In this instance the plants from the C. E. F. seed produced more than twice as much early fruit as that from imported seed. In addition to the six earliest tomatoes for 1905, the Dominion Day, Frogmore Selected, and Chalk's Early Jewel are three early varieties which produced more fruit up to August 10 than those in the table of earliest. The reason they were not included is that they did not produce as much ripe fruit before August 10 as some of the others, and hence could not be considered quite as early. The Dominion Day and Chalk's Early Jewel were, however, among the earliest six in 1904.

Owing to the cloudy, showery and comparatively cool summer the yields are not as large as they have been in more favourable seasons. The seed was sown in hotbeds on March 29, and the plants pricked out into strawberry boxes on April 25, and kept in a cold frame until June 7, when they were planted in the open air. They were

planted four feet apart each way and five plants of each variety were used. The soil was a light sandy loam. The soil was kept cultivated until the plants covered the ground. The plants were not pruned or trained in any way in the test of varieties.

TOMATOES—TWELVE BEST YIELDING VARIETIES, 1905.

Name of Variety.	Date of first Ripe Fruit, 1905.	Yield of Ripe Fruit to Aug. 10, 1905, 5 plants.		Yield of Ripe Fruit per acre to Aug. 10, 1905.		Total Yield of Ripe Fruit, 5 Plants — All pickings, 1905.		Total Yield of Ripe Fruit per plant, 1905.		Remarks.
		Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	
Bright aad Early.....	July 27	4	12	2,586	6	64	12	12	15	Below medium size, regular, smooth, scarlet.
King Humbert.....	Aug. 2	5	..	2,722	8	57	4	11	7	Below medium size, pear shaped, scarlet.
Nolte's Earliest (C.E.F.)	July 26	10	12	5,853	6	55	4	11	1	Medium size, wrinkled, scarlet.
Thorburn's Earliest.....	Aug. 7	2	..	1,089	..	53	12	10	12	Medium size, almost smooth, scarlet.
Nolte's Earliest...	July 25	6	12	3,675	6	51	8	10	5	Medium size, wrinkled, scarlet.
Bond's Early Minnesota.	Aug. 5	3	..	1,633	8	50	8	10	2	Below medium size, smooth, regular, purplish pink.
Dominion Day.....	July 24	13	4	7,214	10	50	4	10	1	Medium size, wrinkled, scarlet.
Chalk's Early Jewel.....	Aug. 1	8	..	4,356	..	50	..	10	..	Medium size, smooth, regular, scarlet.
The Marvel.	" 2	2	12	1,497	6	49	..	9	13	Medium size, smooth, very regular, scarlet, handsome.
Democrat.....	" 7	3	..	1,633	8	47	8	9	8	Above medium size, smooth, purplish pink.
Freedom	July 26	2	8	1,361	4	47	8	9	8	Below medium to medium size, regular, smooth, scarlet.
Frogmore Selected.....	" 28	8	12	4,764	6	44	..	8	13	Below medium size, smooth, scarlet.
*Sparks' Earliana(C.E.F)	" 21	18	8	10,073	4	43	.	8	10	Medium size, smooth, scarlet.

TOMATOES—SIX EARLIEST VARIETIES, 1905.

Sparks' Earliana (C.E.F)	July 24	18	8	10,073	4	43	..	8	10	Medium size, smooth, scarlet.
Maule's Earliest	" 26	10	8	5,717	4	38	8	7	11	Medium size,smooth to wrinkled, scarlet.
Money Maker	" 25	7	..	3,811	8	32	4	6	7	Medium size, wrinkled, scarlet.
Sparks' Earliana..... ..	" 27	7	..	3,811	8	39	..	7	13	Medium size, smooth, scarlet.
Early Ruby.	" 24	6	12	3,675	6	23	12	4	12	Medium size,smooth to wrinkled, scarlet.
Quicksure	" 18	5	7	2,960	11	37	15	7	9	Medium size, wrinkled, scarlet.
Conqueror.....	" 26	4	..	2,178	..	26	8	5	5	Medium size, almost smooth scarlet.

* NOTE.—Imported seed of Sparks' Earliana yielded 39 lbs. ripe fruit of which only 7 lbs. matured, by Aug. 10.

TOMATOES—EXPERIMENTS IN PRUNING.

In the annual report for 1904, the results of an experiment in a certain method of pruning tomato plants were published. The experiment was continued during the past season. The seed was sown on March 10, and the plants pricked out on March 30; and transplanted again into strawberry boxes on April 19. As soon as the plants in the hot-

beds had six strong leaves on them, which was on May 2 in 1905, the tops were nipped off and the plants given more room, being placed 5½ inches apart. The object of pinching off the tops of the plant was to cause new shoots to develop at the axils of the leaves in order to have six branches bearing tomatoes instead of the one cluster usually found at the top of the plant. These were planted out on June 7 alongside other plants unpruned. On July 4 half of the pruned plants were again pruned, all laterals being taken out, and the six main branches only being left. This left 20 plants for each system. The further advanced the axillary shoots are when the plants are set out the larger the early crop is likely to be. In the following table will be found the results of the experiment with Sparks' Earliana for the years 1904 and 1905, and of Chalk's Early Jewel for 1905. It will be seen that there is considerable advantage in pruning by this method.

Name of Variety.	Date of First Ripe Fruit, 1904.	Date of First Ripe Fruit, 1905.	Ripe Fruit First Three Pickings, 1904.		Ripe Fruit First Three Pickings, 1905.		Total Yield of Ripe Fruit, 1904.		Total Yield of Ripe Fruit, 1905.	
			Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.
Sparks' Earliana :										
Unpruned	July 23	July 18	9	..	5	4	84	..	182	4
Pruned once	Aug. 13	July 25	6	..	11	..	137	10	212	..
Pruned twice	Aug. 12	July 25	18	..	16	8	132	13	134	8
Chalk's Early Jewel :										..
Unpruned	..	July 16	..	..	5	3	..	..	240	11
Pruned once	..	July 29	..	..	1	..	..	..	256	..
Pruned twice	..	July 29	..	..	2	12	..	..	173	12

While the unpruned plants produced the earliest fruit, in the case of the Sparks' Earliana, the yield from the pruned plants for the first three pickings in 1904 was, from the plants pruned twice, double the crop from those not pruned; and in 1905 more than three times from those pruned once (merely nipped off at top) than from those not pruned. The Chalk's Early Jewel, which is not quite so early, did not show such an advantage. The first three pickings represented the crop up to August 4. On August 10 the crop of ripe fruit up to that date from the unpruned Sparks' Earliana was 17 lbs. 4 ounces; from plants pruned once, 56 lbs., and from plants pruned twice, 64 lbs. 8 ounces, showing nearly four times as great a yield from the pruned as from the unpruned. The difference in the Chalk's Early Jewel was even greater. On August 10 the crop of ripe fruit from the unpruned up to that date was 13 lbs. 3 ounces; from plants pruned once, or simply headed back, 41 lbs., from plants pruned twice, 58 lbs. 4 ounces. This year the price of tomatoes was still high on August 10, and hence good returns would have been had from pruning. From the experience of 1904 and 1905 it would appear that the most early fruit is obtained when the plants are headed back before planting out and pruned once after planting.

TOBACCO.

The variety test of tobacco was continued this year and 49 varieties were grown. A few of the kinds which had done well in previous years were grown in larger areas, and following will be found a table giving the names of the varieties and the yields obtained from each. The tobacco seed was sown in a hotbed on April 8, the young plants transplanted to a cold frame on May 18, and set out in the open 3 by 3½ feet apart on June 8. The soil was sandy loam which had been well manured with rotted barnyard manure. There was a hailstorm during the growing season which did much injury to the leaves and lessened the quantity of first grade tobacco. The plants were cut on September 14 and taken to the curing house. The tobacco was stripped during

the latter part of November and early in December, and experiments in fermentation have been planned.

Name of Variety.	Number of Plants.	Weight of 1st Grade.		Weight of 2nd Grade.		Weight of 3rd Grade.		Total Yield per Acre all Grades.		Condition when cut, Sept. 15.
		Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Long Leaf Gooch.....	265	53	..	.....	.....	12	..	1017	9	Near ripe.
Little Oronoka..... ...	326	44	..	2	..	11	..	725	6	Ripe.
Havana.....	416	19	..	8	..	19	..	458	12	"
Connecticut Seed Leaf....	383	75	..	24	8	37	..	1478	9	Near ripe.
Improved White Burley...	250	34	..	2	..	7	..	713	9	" "
Kentucky Burley.....	585	109	..	52	..	42	..	1439	9	" "
Lacks	280	55	..	4	..	10	..	1022	5	Ripe.

ARBORETUM AND BOTANIC GARDEN.

The winter of 1904-5 was a favourable one for trees, shrubs, and herbaceous plants, as there were no very low temperatures and there was a good covering of snow, hence there was no special injury to plants this year, although there was the usual killing back of the half hardy and tender species. The summer season was a favourable one for growth and most of the specimens did well this year. There were 263 species and varieties of trees and shrubs planted in the spring of 1905, and when the records were completed in the autumn it was found that there was a total of 3,229 species and varieties of trees and shrubs living in the Arboretum represented by 5,010 specimens. Among the interesting things planted this year may be mentioned a fine collection of Cratægus donated by the Arnold Arboretum.

The herbaceous borders looked well this year, and additions were made to the collection there, making a total of 2,041 species and varieties of herbaceous perennials living in the autumn of 1905. There are, without doubt, some synonyms among the trees and shrubs, as well as the perennials, not yet identified, but the number of these is not large.

Following is a record of the information which has been published in previous reports regarding plants in the Arboretum and Botanic garden:—

In 1899 a catalogue of the trees and shrubs in the Arboretum which had been tested up to that time was published conjointly by Dr. Wm. Saunders and the writer. In this catalogue the scientific names of the trees and shrubs are arranged alphabetically, and when a species or variety has a common name this is also given. The countries are named of which the trees and shrubs are native, also the year in which they are planted. Notes on the hardiness of the specimens were published in this bulletin.

In the annual report of the writer for 1897 a descriptive list was published of what was considered 'the best one hundred hardy ornamental trees and shrubs,' and 'the best one hundred herbaceous perennials.' This list has proven very useful to many persons. In the writer's report for 1898 a short 'Additional list of Herbaceous Perennials' is given. In the report for 1899 another short descriptive 'List of Additional Good Perennials,' and a descriptive list of 'The Best Low Growing Flowering Shrubs.' The report for 1900 contains 'Descriptive Lists of the Best Woody and Annual Climbers,' and that for 1901 'A Descriptive List of the Different Species and Best Varieties of Lilacs.' In 1902 was published 'A List of Best Spring Flowering Perennials,' in 1903 a list of 'Deciduous Trees, Shrubs and Climbers with Attractive Foliage, Bark and Fruit,' in 1904 'A List of the Genera in the Arboretum with the Number of Species of each Genus.'

REPORT OF THE CHEMIST.

(Frank T. Shutt, M.A., F.I.C., F.C.S., F.R.S.C.)

Ottawa, December 1, 1905.

Dr. Wm. Saunders, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith the nineteenth annual report of the Chemical Division of the Experimental Farms.

Investigations have been carried on during the past year in all the more important branches of agriculture, and many problems in connection with dairying, fruit growing, grain growing, cattle feeding, &c., have received our attention.

Soils.—We are able to present data of an important character regarding the accumulation of nitrogen in the soil through the growth and turning under of clover. The results were obtained by the analysis of certain soils before and after the growth of clover, the period of the experiment extending over two seasons. In former years we have determined the fertilizing influence of the legumes by estimating the nitrogen they contained and by the increase of yield in the crop succeeding them. The method employed in the work now reported on is more direct and attacks the problem from another standpoint. It is a matter of interest to note that the results from all three methods practically agree, thus furnishing evidence of a most complete and satisfactory nature respecting this economic means of soil improvement.

The study of the various factors by which the soil's moisture may be controlled has been continued, the experiments being conducted, as during 1904, on the Experimental Farm at Ottawa, Ont., and Nappan, N.S. The object of the investigation has been to obtain information that would be of assistance in the rational management of orchard soils. Though the results here, owing to a somewhat heavy rainfall, do not show the necessity of cultivation, the experiments at Nappan clearly demonstrate the injurious effect of a grain crop in the orchard and also indicate the benefit to be derived from the dry earth mulch, in localities in which a limited precipitation prevails.

Closely associated with the growth of the legumes for soil enrichment is the question of inoculation: Is it necessary to inoculate the soil or the seed in order to obtain the best results with clover and Alfalfa? We discussed this subject at length in last year's report, stating our position regarding the practical value of cultures. This season we continued the research, using cultures kindly supplied by the Bureau of Plant Industry, Washington, D.C., and the Ontario Agricultural College, Guelph, Ont. Though on the whole the results are more favourable than those obtained in 1904, I doubt very much if they should be construed as indicating that any general benefit would be derived from cultures in districts in which clover and Alfalfa have already flourished.

Chemistry of Insecticides and Fungicides.—Under this heading will be found chapters on several interesting investigations relating to sprays and mixtures used in the destruction of insect and fungus pests, as follows:—

(*a*) An account of Soda-Bordeaux and the injury to fruit trees that may result from the addition thereto of Paris green.

(*b*) A discussion of some new forms of Kerosene Emulsion, including a review of the so-called lime emulsions, and a description of certain emulsions in which flour

was substituted for lime. The lime emulsions were first proposed and made by Professor Close, of the Delaware Experiment Station, and we found them fairly stable, homogeneous, easy to spray and not clogging the nozzle. The flour emulsions, suggested by the writer, were also shown to answer equally well, if required for immediate use.

(*c*) The action of solutions of Formalin on the vitality of wheat has been ascertained and the strength of certain brands of Formalin has also been determined. The large quantity of this chemical now used in the North-west in the treatment of grain for the prevention of smut makes the information now given timely and valuable.

(*d*) The relative efficiency of certain cyanides, used in the production of hydrocyanic acid for the fumigation of trees and shrubs for the destruction of the San José scale is given.

Fodders and Feeding Stuffs.—In addition to the tabulation and discussion of a number of analyses of concentrated feeding stuffs and condimental foods made during the past year, we present the results of the examination of the chief field roots, and show that marked differences in feeding value may occur. The influence of heredity or 'breed' is also shown by examples of two well known varieties of mangels.

Sugar Beets.—Three varieties usually grown for factory purposes, Vilmorin's Improved, Klein Wanzleben, and Très Riche, as grown on the Dominion Experimental Farms during the past season have been analysed as to their sugar content.

Well Waters.—One hundred and sixteen samples of water from farm homesteads have been received. The tabulated results from 83 of these are given, together with a short report on their quality from the sanitary standpoint.

Samples Received from Farmers.—The number of these continues to increase. A large proportion of them have been examined and reported upon. This very useful branch of our work, though affording very little material for the annual report, is one, I believe, of immense value to the farming community. It certainly entails a large amount of labour, but as it is distinctly educative and helpful in character, it must receive attention, though at times it undoubtedly interferes with the research work in progress. If, however, all branches of the work of the Chemical Division are to be maintained, further laboratory assistance will be necessary.

The following table states the number of samples received, their nature, the province from which they come, and those still awaiting examination.

SAMPLES RECEIVED FOR EXAMINATION AND REPORT NOVEMBER 30, 1904, TO DECEMBER 1, 1905.

Sample.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.	Number still awaiting examination.
Soils	29	27	19	6	52	9	1	62	2	207	60
Muds, mucks and marls	3	.....	.....	.	.....	2	4	6	1	16	7
Manure and fertilizers	.....	...	....	3	11	6	.....	11	.....	31	3
Forage plants and fodders	13	10	7	5	165	11	10	9	.....	230	36
Well waters	7	6	12	8	52	15	9	3	4	116	0
Miscellaneous, including dairy products, fungicides and insecticides	2	9	1	7	27	25	6	4	2	83	7
Totals	54	52	39	29	307	68	30	95	9	683	113

Investigations Relating to Dairying.—These include the examination of milk preserved by hydrogen peroxide as received from Denmark (the Budde method), the analysis of a milk powder prepared from whey, an inquiry into the volatile acid content of two-year-old cheese, and several other matters of more or less interest. The reports of these investigations are published in Bulletin No. 8, Dairy Series, May, 1905.

Grades of Wheat.—In conjunction with the Cereal Division, an investigation to determine the value of the various grades of wheat (Manitoba Inspection Division) was undertaken in the early months of the present year. The results are presented, together with those from the Cereal Division, in Bulletin No. 50 of the Experimental Farms Series.

The Winter Care of Manure.—This series of experiments was planned to ascertain the losses of plant food that may take place from December to April when manure is piled in large and small heaps, respectively. We are not reporting on the results this year, as it seems desirable to confirm the data by further trials.

Correspondence.—From November 30, 1904, to December 1, 1905, the letters directed to this division, in addition to those referred to us by the other departments of the farms, numbered 1,531; those sent out, 1,441.

Acknowledgments.—The investigations and analyses undertaken by the Division have satisfactorily progressed, due chiefly to the painstaking and excellent work of the Assistant Chemists, Mr. A. T. Charron, M.A., and Mr. H. W. Charlton, B.A.Sc. My thanks are due to them for most valuable aid in carrying out the various researches here reported on.

Mr. Charron, in addition to his duties here, has delivered a number of lectures on agricultural topics at Farmers' Institute Meetings, spending a month in the province of Quebec, and another month in New Brunswick. In all, more than 60 addresses were given.

Mr. J. F. Watson has continued to discharge his duties in connection with the secretarial work of the division and has earned my thanks for the thorough and careful manner in which everything entrusted to him has been done.

I have the honour to be, sir,

Your obedient servant,

FRANK T. SHUTT,

Chemist, Dominion Experimental Farms.

THE NITROGEN-ENRICHMENT OF SOILS THROUGH THE GROWTH OF LEGUMES.

Many analyses of exhausted or, more correctly speaking, partially exhausted soils from cultivated areas have shown unmistakably that in the majority of cases the soil's constituents that have more particularly been dissipated through successive cropping and poor farming are organic matter (humus) and its concomitant, nitrogen. Again, it has almost invariably been found that our virgin soils of great productiveness are well supplied with these constituents and that accompanying them there is a goodly proportion of the mineral elements of plant food in readily assimilable forms.

As an illustration of the effect of continuous cropping and cultivation, without manure of any kind, on the soil's nitrogen-content, the following cases may be cited: During the past season samples of soils—virgin and cultivated, and from closely adjacent areas—were collected in the North-west Territories and analysed. The re-

sults show a marked decrease in the percentage of nitrogen in the cultivated lands. One series may suffice. Regarding the cultivated soil, we possess a complete and authenticated record of the cropping and fallowing since the prairie was first broken, 22 years ago. It had borne six crops of wheat, 4 of barley, and 3 of oats, with fallows (9 in all) between each crop since 1887. No manure had ever been applied. The sample of virgin soil for comparison was taken from an adjacent area that had never been cultivated, the point of collection being about 120 feet distant from where the cultivated soil sample was taken. Both samples were of a composite character and every precaution taken to have them thoroughly representative. It may, further, be added that there is every reason to suppose that the soil over the whole area examined was originally of an extremely uniform nature; in other words, that at the outset the nitrogen content was practically the same for the soils now designated as virgin and cultivated respectively. The results of the investigation are given in the following table:—

Nitrogen.

	Per cent.	*Lbs. per acre.*
Virgin soil to a depth of 4 inches.....	·409	3,824
Cultivated soil to a depth of 4 inches.....	·257	2,402
Difference, or loss due to cropping and cultural operations....	·152	1,422
Virgin soil, to a depth of 8 inches..	·371	6,936
Cultivated soil to a depth of 8 inches..	·253	4,730
Difference, or loss due to cropping and cultural operations..	·118	2,206

Though in all probability the virgin soil has gained somewhat in nitrogen during the period of 22 years, for that is the tendency with soils in sod, the increase could not have been such as to materially affect the deduction that a very considerable depletion of soil nitrogen has followed the practice of continued cropping with grain and fallowing. The results show that the cultivated soil is to-day still very rich, yet compared with the untouched prairie it is seen to have lost one-third, practically, of its nitrogen. This is highly significant. Humus and nitrogen must be returned, either as manure or by the occasional growth of certain enriching crops, or fertility will inevitably decline. The productiveness of many of our soils is due largely to the accumulation of centuries, but these stores of plant food may be and are in many places being unduly dissipated through irrational methods and with even our best soils it cannot be many decades before decreased yields will show the necessity of occasionally replenishing the soil's humus and nitrogen.

The work of the experimental farms during the past fifteen years has shown that wherever climatic conditions allow, this replenishing of humus and nitrogen, this maintenance, and indeed increase, of fertility may be most readily and economically accomplished through the growth of one or other of the legumes—a family of plants possessing the unique and valuable property of appropriating the free nitrogen of the atmosphere. In establishing the manurial value of the legumes, the nitrogen-content of a number of those more commonly advised from the standpoint of soil enrichers has been determined. The results of these analyses are to be found in several of the past reports of this Division. Evidence has also been brought forward by determining the yields of various farm crops following the growth of clover or other legume. The data that we have accumulated on this important subject are voluminous, but they all point in the same direction—the increase of productiveness following the growth of the legume.



Photo. by F. T. Shutt.

SERIES NO. I. WASHINGTON CULTURES.

ALFALFA No. 1. Seed Inoculated.
No. 2. Untreated.
No. 3. Soil Inoculated.

CLOVER No. 4. Soil Inoculated.
No. 5. Untreated.
No. 6. Seed Inoculated.

SERIES NO. II. GUELPH CULTURES.

ALFALFA No. 1. Soil Inoculated.
No. 2. Untreated.
No. 3. Seed Inoculated.

CLOVER—No. 4. Soil Inoculated.
No. 5. Untreated.
No. 6. Seed Inoculated.

The experiments now to be described had for their object the estimation of the amount of nitrogen that became part and parcel of the soil nitrogen through the growth of clover. By the analysis of the soil before sowing and after the decomposition of the legume it was thought that data of a valuable character would be obtained. The work was carried on in experimental pots and on a small plot simultaneously, soil poor in nitrogen being purposely selected for the investigation. The plan was to determine as accurately as possible its nitrogen content at the outset, to sow it with clover, to return the crop to the soil and after its decay to again determine the soil's nitrogen. The experiments were continued over a period of two seasons.

Pot Experiments.—Twenty-one pots, each having a diameter of 8 inches and a depth of 12 inches, were filled to a height of 9 inches with soil containing 0·0392 per cent nitrogen. These were sown with Mammoth Red clover on May 13, 1902. The pots were then sunk in the soil, level with the surface, so that moisture and temperature conditions for the clover might be as nearly normal as possible. On October 13 of the same year (1902) the crop (including the roots) was taken up, cut very fine and returned to the soil—the cut clover and the soil being thoroughly mixed. Throughout the following winter the pots were kept in the laboratory building and the soil maintained in a moist condition, so that the decay of the clover might be as complete as possible.

On June 13, 1903, the pots were again sown with Mammoth Red clover, and the growth returned to the soil in the autumn as in the previous year. In the spring of 1904 (May 14) the soils were again thoroughly mixed and sampled, the undecomposed fibre being carefully separated, and analysed. The result was 0·0457 per cent nitrogen.

Plot Experiment.—The plot used was 1/990 of an acre. Its soil to a depth of 8 inches was removed and replaced with soil thoroughly uniform throughout and containing 0·0437 per cent nitrogen. The plot was sown with Mammoth Red clover on May 13, 1902. During the season's growth the clover was cut twice and allowed to decay on the soil. At the close of the season (October 17) the crop was turned under, the soil being stirred to a depth of 4 inches. In the following spring (1903) the plot was again sown with clover which made a very fair growth. This was cut twice and finally turned under as during the previous year. On May 14, 1904, the soil of the plot was sampled to a depth of 4 inches and its nitrogen-content determined. This was now 0·0580 per cent. The following tabulated statement permits of a ready review of the results obtained:—

NITROGEN—Content of Soil before and after the Growth of Clover.

	NITROGEN.	
Pot Experiment.	Percentage (in water-free soil).	Pounds per Acre to a depth of 9 inches.
Before experiment	·0392	1,076
After experiment	·0457	1,255
Gain due to two years' growth of clover	·0065	179
Plot Experiment.		To a depth of 4 inches.
Before experiment	·0437	533
After experiment	·0580	708
Gain due to two years' growth of clover	·0043	175

The data furnish further evidence of a very satisfactory character concerning the manurial value of clover. In one set of trials, two seasons of clover had enriched the soil with nitrogen to the amount of 179 lbs. per acre, calculated to a depth of 9 inches; in the other, calculated to a depth of 4 inches, the increase was 175 lbs. per acre. This nitrogen, although not present in an immediately available condition, is associated with readily decomposable organic matter and would be set free for the use of succeeding crops.*

INOCULATION FOR THE GROWTH OF LEGUMES.

A statement regarding the results of work carried on in this investigation since 1896, by the Experimental Farms, was given in the report of this Division for last year (1904). After briefly recounting the results we had obtained from the use of German and American cultures, the opinion was expressed that the necessity for inoculation was by no means so great as was supposed by many; in other words, that the soil bacteria that serve to fix the nitrogen in the legumes had been found to be widely distributed over the Dominion. Our experience this year confirms this view. During the past season, clover plants have been received from several districts in Manitoba, all bearing nodules on their roots. Observation has gone to show that in the majority of cases in which there has been failure to obtain a good catch of clover that one or more of the following causes have been to blame rather than the absence of the necessary bacteria: Deficiency of moisture; unsuitable mechanical condition of the soil, due to lack of humus, inadequate drainage, or improper working of the soil; acidity or sourness of the soil; poor seed; or, if the crop failed the second season, the severity of the winter.

Last season (1904) we experimented with the new cultures for clover and alfalfa supplied by the Bureau of Plant Industry, Washington, D.C. The results were, on the whole, unsatisfactory, and we were consequently not in a position to report very favourably. This season we have continued the investigation with the Washington cultures, and also have experimented with those supplied by the Ontario Agricultural College, Guelph, the latter being kindly furnished by Prof. Harrison, Bacteriologist. The trials were conducted in pots and plots.

POT EXPERIMENTS.

These were made in clean, new flowers pots, with a diameter at the top of 11 inches and a depth of 13 inches. The soil was a light sandy loam of poor quality. After sowing, the pots were plunged, the rim (2 inches) only being above the surface of the soil. This was done in order to avoid as far as possible sudden changes in temperature and moisture content.

The inoculating fluids were prepared in accordance with instructions received with the cultures. In the case of the 'seed inoculated,' the seed was immersed in the cultural preparation for a few minutes and then allowed to dry by exposure to the air; with the 'soil inoculated' the inoculating fluid was used to moisten the soil to a depth, approximately, of one inch. The same number of seeds were sown in each pot.

Note.—The relatively larger increase in nitrogen obtained in the plot experiment may be accounted for by the fact, often observed, that the greater part of the root system of the clover lies in the first or upper six inches of soil. It is also possible that there had been a more complete decomposition of the clover in the plot than in the pots.

CLOVER: Weight of Fresh Material, in Grams.

Date of Cutting.	O. A. C. CULTURE, SOWN 6TH MAY, 1905.			WASHINGTON CULTURE, SOWN 13TH MAY, 1905.		
	Untreated.	Seed Inoculated.	Soil Inoculated.	Untreated.	Seed Inoculated.	Soil Inoculated.
July 17	125·7	124·2	128·6	109·7	91·9	110·0
August 12	125·8	183·3	175·3	113·7	146·4	141·3
September 30	123·2	143·2	140·5	143·5	149·4	161·9
Totals	374·7	450·7	444·4	366 9	387·7	413·2

On the date of the first cutting, July 17, no difference in vigour of growth could be observed between the O. A. C. culture pots, and the weights of the crops then taken show that the growth was practically the same in the treated and untreated pots. With regard to the Washington culture pots, the same might also be said, though the crop from the 'seed inoculated' fell somewhat behind that of the other two pots.

The data of the second and third cutting, however, show in nearly every instance a marked increase of growth from the treated clovers, so that the total weights of foliage produced in the season from them exceeded those of the untreated and check pots. Larger returns were obtained from the O. A. C. than from the Washington cultures; the results, however, do not make clear whether seed or soil inoculation was the more effective.

We may now similarly consider the data from the Alfalfa.

ALFALFA: Weight of Fresh Material, in Grams.

Date of Cutting.	O. A. C. CULTURE, SOWN 6TH MAY, 1905.			WASHINGTON CULTURE, SOWN 9TH MAY, 1905.		
	Untreated.	Seed Inoculated.	Soil Inoculated.	Untreated.	Seed Inoculated.	Soil Inoculated.
July 17	58·1	47·3	55·5	69·0	63·6	51·3
August 8	71·5	71·1	83·1	78·8	72·6	99 6
September 19	74·9	98·9	110·5	96·7	104·8	141·4
Totals	204·5	217·3	249·1	244·5	241·0	292·3

It will be noticed that as in the case of the clover, the first cuttings of Alfalfa showed no increase from the inoculated pots, indeed, the untreated seed in each case gave slightly higher yields. At the time of the second cutting, the 'soil inoculated' alone showed an advantage. An increase, however, was observed when the third cutting was made in treated Alfalfas, more especially in the 'soil inoculated' pots. Considering the total yields, it will be seen that it is only in the latter that any benefit has been derived from the cultures. The differences throughout are not large and, therefore, can scarcely be used as an argument to prove the practical value of the Alfalfa cultures.

These pots, both clover and Alfalfa, are being kept over the winter in the hope that their respective yields may be obtained next season.

PLOT EXPERIMENTS.

Clover, O. A. C. Culture.—Adjoining areas of fairly uniform soil, each 33 by 32 feet, were sown with inoculated and untreated seed. The date of sowing was May 9. Owing to the appearance of weeds, the first cutting was raked off and not weighed. The yields of subsequent cuttings were weighed as hay.

—	From Untreated Seed.		From Inoculated Seed.	
	Lbs.	Ozs.	Lbs.	Ozs.
Cutting, August 9	15	13	20	12
" Sept. 27	30	14	39	1
Total	46	11	59	13

Clover, Washington Culture.—These plots were also contiguous, each measuring 80 by 12 feet. The date of sowing was April 25. The first cutting was raked off and not weighed, owing to weeds.

—	From Untreated Seed.		From Inoculated Seed.	
	Lbs.	Ozs.	Lbs.	Ozs.
Cutting, August 9	48	12	61	1
" Sept. 27	44	13	44	13
Total	93	9	105	14

From the inoculated seed, in both instances, larger yields of hay were obtained.

Alfalfa.—Owing to insufficient drainage on one of the plots used in the experiment with Washington culture the results were vitiated, and accordingly are not given. With the O.A.C. culture, the plots were 33 by 22 feet, and adjoining; the soil, as far as could be judged, was fairly uniform throughout.

Culture—Ontario Agriculture College.	From Untreated Seed.		From Inoculated Seed.	
	Lbs.	Ozs.	Lbs.	Ozs.
Cutting, July 11	29	1	12	13
" Aug. 9	24	5	22	14
" Sept. 27	34	14	27	2
Total	88	4	62	13

We could not say that inoculation had decreased the yield, the falling off is most possibly due to other causes, but the fact remains that a heavier crop of Alfalfa hay was obtained from untreated seed in all three cuttings.

It is to be hoped that the plants on all these plots will survive the winter, so that the effect of the cultures during the second season of growth may be determined.

At the close of the season a number of roots, both of Clover and Alfalfa, from all the plots were carefully examined, but no difference in either the size, number or distribution of the nodules was to be observed, indicating that the soil of the experimental farm is well supplied with the nitrogen-fixing bacteria.

SESSIONAL PAPER No. 16

THE CONTROL OF SOIL MOISTURE IN ORCHARD SOILS.

EXPERIMENTS AT THE EXPERIMENTAL FARM, OTTAWA, ONT.

Various phases of the 'cover' crop system have been under examination for a number of years past in the orchards of the Experimental Farms at Ottawa, Ont., and Nappan, N.S., the two chief points receiving attention from the Chemical Division being the control of the soil's moisture throughout the spring, summer, and autumn seasons, and the increase of the soil's fertility.

These investigations have received discussion from year to year in the annual report, so that it merely remains to state the nature of the work of 1905 and to consider the results obtained.

Two series of experiments, each comprising 3 plots, were instituted. In the first series we sought to ascertain the moisture-content of soil under a thick mulch of straw as compared with that of a soil constantly cultivated, and consequently covered with a dry earth mulch. A plot in which the soil was left undisturbed was also included, with the expectation that its moisture-content would be found to be less than that of either of the mulched soils.

The object of the second series was to learn the relative moisture-content of soil carrying (*a*) a crop of Hairy Vetch, (*b*)a crop of tares, with that of a soil kept constantly cultivated.

This work has been, as heretofore, carried on with the advice and co-operation of Mr. W. T. Macoun, Horticulturist, to whom my thanks are due for much valuable aid.

The past summer, as regards rainfall, was characterized by an ample and well distributed precipitation, and consequently the results do not show, as they do in so many of our previous trials, any marked advantage accruing from cultivation.

Series I., Plots A, B, and C.—The first collection of samples was made on June 5, when plot C was heavily mulched with straw. The dates of cultivation for plot A were June 5, 15, 24, and 28; July 7, 22; August 4, 17 and 25; September 1, 13 and 25. Plot B was left undisturbed, but as a crop of weeds appeared it was mown July 22, to prevent them from going to seed.

SERIES I.—Conservation of Soil moisture, C. E. F., Ottawa, Ont., 1905.

Date of Collection.	Rainfall.	Plot A. — Cultivated.			Plot B. — Undisturbed.			Plot C. — Mulched with Straw, 10 in. to 12 in.		
		Water.			Water.			Water.		
		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.	
	Inches.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.
June 5	*2·29	15 87	360	1,012	18·07	421	1,132	16·57	379	1,131
" 26	3·22	20·62	496	874	20·21	484	131	19·01	448	1,154
July 10	1·60	23·60	655	1,578	20·95	506	975	21·31	530	510
" 24	2·12	18·25	426	1,280	18·92	445	1,916	18·17	424	709
Aug. 8	2 54	18·84	443	1,269	19·77	470	1,860	17·63	409	330
" 21	2·45	17·71	410	1,383	17·60	408	398	20·29	486	939
Sept. 5	1·96	15·07	339	217	16·99	391	311	20·52	493	815
" 18	·64	15·21	342	1,648	17·52	405	1,887	21·67	525	1,198
Oct. 2	1·36	17·81	414	250	18·14	423	997	19·95	476	572
" 16	1 40	19·43	460	1,756	19·31	457	709	22·48	554	406

* May 1 to June 5.

All three plots show a remarkable uniformity in moisture-content, due no doubt to the high rainfall before referred to. The effect of the straw mulch in conserving moisture is, however, observable after August 21, for from that date on to the end of the season the soil of plot C contained from 2 per cent to 5 per cent more moisture than that of either of the other plots. On one or two dates it appears that the undis-

turbed plot contained slightly higher percentages of moisture than the cultivated plot, but the differences are very small and we may conclude that both soils were very nearly at the point of saturation throughout the season.

Series II.—Plots D. E. and F.:—Plots E. and F. were sown in rows 8 inches apart, respectively with Hairy Vetch and tares on June 30. Plot D. was cultivated June 16, 24 and 28, July 12, 22, August 4, 17 and 25, September 1, 13 and 25. The first collection of soils was made on June 16.

SERIES II.—Conservation of Soil Moisture, C. E. F., Ottawa, Ont., 1905.

Date of Collection.	Rainfall.	PLOT D. — Cultivated.			PLOT E. — Hairy Vetch.			PLOT F. — Tares.		
		Water.			Water.			Water.		
		Per cent.	Per acre.		Per cent.	Per acre.		Per cent.	Per acre.	
			Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.
June 16	*5·37	13·16	306	1,539	11·62	266	188	12·16	280	463
" 30	1·16	12·81	297	823	10·78	244	1,173	10·48	236	1,966
July 14	1·25	13·24	308	1,837	10·60	240	36	11·48	262	1,057
" 28	1·85	11·79	270	1,130	8·31	183	931	10·22	230	868
Aug. 11	2·14	10·44	235	1,934	8·38	185	305	9·75	218	1,384
" 25	2·45	8·56	185	1,003	8·91	198	16	9·21	205	702
Sept. 8	2·01	10·08	226	1,847	10·66	241	1,077	9·83	220	1,364
" 22	1·61	14·76	350	1,049	12·49	288	1,844	12·53	232	1,634
Oct. 6	·74	12·79	296	1,759	9·36	209	1,185	10·82	245	1,208
" 20	1·52	16·08	387	1,770	17·35	424	1,889	15·52	371	1,778

*May 1 to June 16

Compared with plot D., cultivated, the soil of plot E., bearing Hairy Vetch, showed a slight falling off in moisture in the early part of the season. After the middle of August, however, save on one or two dates, it would not appear that the soil with the crop had at all suffered any moisture exhaustion, so ample was the rainfall and effective the protection offered by the heavy growth that was made.

The draft on the soil moisture through the growth of Tares was very similar to that noticed in the case of the Hairy Vetch; it was not sufficient to cause any very marked effect. This we attribute to the causes just mentioned. The Tares, as did the Vetch, grew luxuriantly, completely covering the ground.

The results this season at Ottawa have not emphasized the necessity of cultivation for conserving soil moisture, but this is easily explained by reference to the rainfall, which it will be seen was both ample and well distributed throughout the season. They must not be considered as throwing any doubt upon the useful function of cultivation in districts where the rainfall is deficient, for that has been amply proven by our expements in past seasons, confirmatory evidence also being given in the chapters following, stating the results obtained this year at Nappan, N.S.

EXPERIMENTS AT THE EXPERIMENTAL FARM, NAPPAN, N.S.

In the experiments conducted on the Experimental Farm, Nappan, N.S., six plots were employed. In this series we are able to contrast throughout the season the moisture content of soil (1) bearing an oat crop, (2) carrying a second season's growth of clover (with Timothy)and harvested, (3) similar to (2) but with the growth cut from time to time and used as a mulch, (4) cultivated till June 15, then sown with Crimson clover, (5) cultivated till July 20, then sown with Crimson clover, (6) cultivated until July 20 then left undisturbed.

Conservation of Soil Moisture, Nappan, N.S., 1905.

Date of Collection.	Rainfall.	Plot 1. Oats harvested with Timothy and Clover.			Plot 2. Clover with Timothy 2nd season's growth —Harvested.			Plot 3. Clover with Timothy 2nd season's growth —Mulched.			Plot 4. Cultivated till June 15 and then seeded with Crimson Clover.			Plot 5. Cultivated till July 20 and then seeded with Crimson Clover.			Plot 6. Cultivated until July 20.		
		Water.			Water.			Water.			Water.			Water.			Water.		
		Per cent	Per acre.		Per cent	Per acre.		Per cent	Per acre.		Per cent	Per acre.		Per cent	Per acre.		Per cent	Per acre.	
	Inches.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.		Tons.	Lbs.
May 15	*3·36	17·40	443	1,716	16·04	401	1,127	17·33	440	1,257	16·50	415	710	16·28	408	1,480	17·76	453	1,845
June 1	·90	16·37	411	872	14·23	348	1,462	13·83	337	711	15·25	378	453	16·97	429	1,209	14·74	363	782
" 16	1·80	15·54	386	1,485	14·88	366	1,599	15·94	398	1,170	16·19	406	207	15·78	393	1,669	18·02	462	58
" 29	1·53	16·30	409	680	19·06	494	1,947	18·52	477	1,526	17·50	445	1,736	17·97	460	932	17·92	458	1,810
July 17	1·39	11·02	260	644	8·08	184	1,533	11·77	280	805	13·89	339	111	15·65	389	1,976	14·50	359	123
Aug. 2	·23	5·63	125	799	7·26	164	1,095	7·12	161	262	9·73	226	1,128	15·50	385	1,129	15·02	371	1,028
" 15	·84½	5·17	114	1,190	5·91	132	56	5·64	120	557	7·87	179	1,108	14·11	345	616	14·03	343	61
" 30	·03½	5·01	110	1,723	4·17	91	930	4·37	96	105	5·26	116	1,402	9·97	232	1,654	14·36	352	904
Sept. 18	3·40	12 66	304	1,358	10·52	247	244	12·58	302	953	11·47	272	659	14·68	367	1,035	16·31	409	1,291
Oct. 3	·57	11 22	265	1,288	9·05	209	309	10·61	249	975	9·24	213	1,986	12·67	304	1,909	13·06	315	1,503
" 18	·09	9·34	222	125	6·71	151	370	8·01	183	53	6·69	150	1,405	9·44	219	215	11·34	268	1,697

*April 1 to May 15.

Rainfall during the season.—April was characterized by a very small rainfall (1·24 inches) not half that which fell in April of the two preceding years. May and June had very fair and well distributed precipitations; the totals were 3·02 and 3·30 inches, respectively. July and August were very dry, the total being only 1·56 and 1·53 inches, many of these rains being so slight that the moisture was evaporated before it could penetrate the soil. September had a fair rainfall, 3·38 inches, while October was comparatively dry, with only 1·29 inches.

Plot 1.—The crop of oats, which had made good growth, though the seed had not filled out well, was harvested on September 3. The results show that the moisture content of this plot was greatly and steadily reduced from the end of June till September 1, and again slightly reduced during October. From the middle of July to the end of August the soil was exceedingly dry (in the neighbourhood of 5 per cent moisture). The oats suffered much from drought during this period and there can be no doubt that the moisture available for the orchard trees was altogether insufficient for their needs. Confirmatory evidence of a most emphatic nature is furnished by the data from this plot of the great exhaustion of soil moisture by a grain crop.

Plot 2.—This carried a crop of clover and timothy, having been seeded (with oats) in the spring of 1904. It was cut on July 20, having made excellent growth, and yielded about 2½ tons of hay to the acre. The moisture content data are very similar to those of Plot 1, indicating a very large draught on the store of soil moisture by the growth of clover. During the first two weeks of July the moisture was reduced from 19·06 per cent to 8·08 per cent and continued to fall until the end of August, when the soil contained only 4·17 per cent.

Plot 3.—This, like Plot 2, bore a crop of clover and timothy, but the growth was cut from time to time and used as a mulch. The first cutting was on June 16, when the crop was about 12 inches high; the second on July 8, with about the same amount of growth. No further cutting was possible, as owing to the very dry period in July and August no material growth was subsequently made. Mr. Blair reports that the mulches rapidly dried out and quickly became valueless in conserving moisture. The analytical data are very much the same as those for Plot 2, and, therefore, confirm the conclusions regarding the great draught on the soil's moisture. They require no special comment further than to say that the mulch seems to have been effective in checking to a certain degree the loss of soil moisture during the first two weeks of July—an important matter. After the middle of July the mulch evidently exercised very little beneficial influence so far as soil moisture is concerned.

Plot 4.—The soil of this plot was cultivated until June 15, and then sown with Crimson clover. The effect of this cultivation is very apparent; it postponed at least two weeks the severe drying out so noticeable on the plots already discussed. On August 2, this soil contained considerably more moisture than those of Plots 2 and 3, and nearly twice as much as that on Plot 1.

Plot 5 and Plot 6.—Were cultivated until July 20, the former at that date being sown with Crimson clover. Plot 5 maintained, practically, its initial moisture content all through the period of drought, the first decline—and that a slight one—being recorded by the determination made on August 30. After the middle of September a further, but not very large, falling off is observable, due to the growth of clover. Plot 6, though showing some fluctuations, practically held its moisture content throughout the growing season.

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* In this investigation the scheme was planned by Mr. W. S. Blair, Horticulturist, Experimental Farm, Nappan, N.S., and myself. Mr. Blair undertook all the work in connection with the plots and also collected the fortnightly soil samples. In his report, full cultural notes, made during the season, are to be found.

The value of cultivation has been by this series well brought out. The severe drought during July and August specially accentuated this year the importance of the dry earth mulch in conserving the moisture so necessary for the growth and thrift of orchard trees, but the results may well serve as a guide for the management of orchard soils in all districts where an insufficient rainfall is likely to occur.

NATURALLY-OCCURRING FERTILIZERS AND WASTE PRODUCTS.

MARSH MUD.

This was collected at Flannery's Point, near Bathurst, N.B., and forwarded by T. M. Burns, M.P.P., through Mr. T. A. Peters, Deputy Minister of Agriculture, Fredericton, N.B.

The sample as received was of a light-grey colour, having all the appearances of clay. It was practically free from stones, sticks, or other foreign matter. On exposure to the air it dried into lumps or masses, which were, comparatively speaking, easily crushed and reduced to powder.

Analysis of (Air-dried) Mud.

	Per Cent.
Moisture	3·83
Loss on ignition-organic matter	15·77
Clay and sand	66·69
Oxide of iron and alumina	8·33
Lime	·65
Magnesia	1·57
Potash	·65
Phosphoric acid	·15
Undetermined, including salt	2·36
	100·00
Nitrogen, in organic matter	·585

It will be obvious from the above data that although this 'mud' is not destitute of plant food it cannot be considered in any way comparable to farm manures or commercial fertilizers. However, if its application does not injuriously affect the tilth or mechanical condition of the soil, I think it might be found a useful amendment.

Its chief fertilizing constituent is nitrogen, of which it contains about as much as is found in our best soils, and, therefore, it is possible that a tolerably heavy application on soils poor in organic matter and nitrogen might prove of considerable benefit.

My advice would be to try it at first on a small area and to note the result, both on the condition of the soil and the crop yield. The character of the soil will no doubt have much to do with its efficiency, and careful notes should be taken as to the nature of the soil to which it is applied and the number of loads spread per acre.

In conclusion, it may be stated that its composition does not, I think, warrant any great expenditure in its application, and this furnishes another reason for ascertaining its effect on a small area before extensively applying it.

SEMI-DECAYED SEAWEED.

This material was forwarded by Mr. Donaldson, of Port Williams, N.S., who furnished the following information regarding its occurrence:

'It is from Westport on Briar Island, the extreme western part of Nova Scotia, where it is quite plentiful all along the shores of the island. It is there used as a fertilizer, chiefly for grain and grass, I think. Several barrels were sent to our county last spring and orchardists in this vicinity would be glad to know its value.'

As received, it was a pasty mass, decomposition apparently having proceeded to a considerable degree.

Analysis of Semi-decayed Seaweed.

	Per Cent.
Water	61·03
Organic matter	28·92
Ash or mineral matter	10·05
	100·00
Nitrogen	1·20
Phosphoric acid	·19
Potash	·90

Some years ago a sample of fresh seaweed (*Fucus furcatus*) was analysed, the data of which may here be given for the purpose of comparison.

Analysis of Fresh Sea-weed.

Water	63·49
Organic matter	27·93
Ash or mineral matter	8·58
	100·00
Nitrogen	·468
Phosphoric acid	·108
Potash	2·025

The general result of the decomposition, it will be seen, has been to increase the nitrogen-content and to decrease the percentage of potash, so that while the fresh seaweed is essentially a potassic manure, the semi-decayed weed is more particularly nitrogenous.

The value of sea-weed as a manure is undoubtedly enhanced by the readiness with which this naturally-occurring fertilizer decomposes in the soil, quickly liberating its constituents in forms available to crops.

GYPSUM OR LAND PLASTER.

The agricultural uses and value of gypsum or land plaster have been discussed in previous publications (see pages 163-4 An. Rep. Exp. Farms 1900). It may, therefore, suffice here to give the results of the analyses of certain samples examined this year. From correspondence we judge that the use of finely ground gypsum in barns and stables is increasing, and we are of the opinion, from all points of view that this in general is the most advantageous method of employing it.

ANALYSES of Gypsum.

—	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Sulphate of lime	94·53	91·58	73·15	68·98	74·25
Insoluble rock matter	·78	2·00	7·45	15·75	11·95
Carbonate of lime, &c. (undetermined)	4·69	6·42	19·40	15·27	13·80
	100·00	100·00	100·00	100·00	100·00

Nos. 1 and 2, labelled 'white' and 'grey,' respectively, and forwarded by General Laurie, Oakfield, N.S. Quarried at Dutch Settlement, Halifax county, N.S.

Both are excellent samples, but the 'white" (No. 1) is somewhat the better of the two. No. 1 has also superior value by reason of its greater fineness.

No. 3. White or grey coloured, manufactured by the Alabastine Co., Ltd., Paris, Ont., submitted by K. McDonald, Ottawa, Ont.

No. 4. Brown or chocolate coloured, supplied by Mr. Manly H. Craig, Perth, N.B., submitted by Kenneth McDonald, Ottawa, Ont.

Sample No. 3 is distinctly superior to No. 4, though neither is equal to the first two samples considered.

No. 5. From 'Plaster Rock,' Tobique River, N.B., furnished by M. H. Craig, Perth, N.B. It is of distinctly better quality than No. 4, though apparently from the same quarry.

FERTILIZING VALUE OF COTTON WASTE.

This refuse material was from the cotton mills at Montmorency Falls, Que. As received, it formed a black, pasty mass and was neutral to test paper. It dried readily on exposure and was then easily reduced to a powder by crushing and grinding.

Analysis of Waste (as received).

	Per Cent.
Water	58·66
Organic matter	15·41
Mineral matter (containing sand, &c., 20·94)	25·93
	100·00
Nitrogen	·72
Phosphoric acid	·27
Potash	·95

We doubt if this waste could be economically manufactured into a fertilizer. The greater part of the water would have to be got rid of—a more or less expensive matter when undertaken on a large scale. Secondly, this accomplished, the percentages of plant food would not then equal those in most brands of commercial fertilizers. And, thirdly, the condition or combination of the plant food in this 'waste' is not the most valuable from the agricultural standpoint: in other words, without treatment, the waste would not readily furnish available nourishment for crops.

If obtained for little cost, however, it might be converted by the farmer into a useful manure by composting, say, with lime or wood ashes.

FLUE ASHES.

These ashes are from the flues or dust chambers of the blast furnaces at the Londonderry, N.S., iron mines. The sample was forwarded by Mr. G. R. Fleming, Folly Mountain, N.S., who thought they might possess some fertilizing value.

Analysis of flue ashes.

	Per Cent.
Lime	12·16
Oxide of iron	31·79
Phosphoric acid	·26
Potash	·17
Nitrogen	·23

Considering the nature of the material, the percentage of nitrogen is quite notable. Presumably the nitrogen is present as ammonium salts.

The percentages of phosphoric acid and potash are very small and though there is a notable amount of lime, we are unable to speak definitely as to its availability. My opinion, therefore, is that the fertilizing value of these ashes is negligable. On heavy clay soils, however, they might be of some benefit in improving the texture.

FODDERS AND FEEDING STUFFS.

Though we have never attempted any systematic or comprehensive examination of the feeding stuffs sold in Canada, we have every year analysed many of them regarding which information and advice have been sought. The use of concentrated feed stuffs to supplement the protein and fat of the home grown fodders, and thus balance the ration, is constantly on the increase. Only a few years ago the feeds employed by farmers and dairymen were very limited in number and comparatively simple in character—bran, shorts, provender and ground Indian corn; these, with the addition of oil cake and one or two meals, comprised the list of those upon the market. But the case is very different now. The by-products of the starch factories, of the rice mills, of the manufactories of breakfast foods, etc., etc., now find a ready sale. These various feeds differ widely in their composition, and hence in their nutritive value, and the farmer cannot intelligently or profitably use them unless he knows their composition, more especially as to the percentages of protein and fat they contain. The protein and fat are the most important and the most costly nutriments in a food. There are, of course, other constituents of feeding value in these 'concentrates,' but in estimating the value of these feeds it is the proportion of protein and fat that must be principally considered, as it is for them practically alone that they are purchased, for the reason already stated.

For a number of years the writer has claimed that an annual inspection and analysis of the feeds upon the Canadian market should be made; in other words, that as there is an official examination of fertilizers (plant foods), so there should be an equal protection to the farmer by the official examination of these feeds (cattle foods), for in many instances it is quite impossible to arrive at a correct opinion as to the value of these by-products without an analysis. This matter has also been reecntly urged by the authorities of the Ontario Agricultural College and the Experimental Union—a society of co-operative workers in connection with that institution.

It is, therefore, with much pleasure that I can announce as a result of these representations that the Department of Inland Revenue, the branch of the Government Service which annually analyses the commercial fertilizers, has taken initiatory steps towards this end. A collection is now being made by the officers of that department in various parts of Canada of these feeding stuffs and the analyses will be made in due course. I am, further, authorized to say that the results of this examination will be published early in the coming year in bulletin form, and thus will be available for the guidance of purchasers.

During the past year a number of such feeding stuffs have been submitted to us. As far as time permitted, these have been analysed. The results appear in the subjoined table, but since in previous reports the sources and character of the greater number of them have received discussion, it will only be necessary now to add briefly remarks upon their comparative values as deduced from the analytical data. They comprise 'mixed' feeds of various character, the products of the starch factories (gluten meal, gluten feed, and corn bran), oil cake and meals, cotton seed meals and a few other miscellaneous feeds. Much of the profit in dairying and stock feeding lies in the judicious balancing of the ration, and we feel assured that great assistance towards that end may be obtained by a consultation of the data here presented.

Analysis of Feeding Stuffs, 1905.

Number.	Name.	Particulars.	Moisture.	Protein.	Fat or oil.	Carbo-hydrates.	Fibre.	Ash.
1	"Cattle Feed" No. 1.....	Insp. of Live Stock Shipments, Montreal.	11·22	9·06	4·29	67·47	5·73	2·23
2	" No. 2.....		9·38	8 06	4·06	69·11	7·19	2·20
3	" No. 3.....		12·82	8·94	3·71	67·24	5·06	2·23
4	" No. 4.....		10·90	10·00	4·57	66·00	6·18	2·35
5	Victor Corn and Oat Feed.	American Cereal Co., Peterboro'...	8·29	7·75	3·29	66·55	12·11	3·01
6	Banner Cattle Food.. ...	" "	8·38	7·75	4·46	68·55	8·56	2·30
7	Ground Oat Hulls.....	" "	5·23	2·81	1·52	53·40	32·48	4·56
8	"Mixed Feed".....	Quoted by J. N. Tilton, St. John, at $30 per ton.	.....	9·63	3·59	.....	.....	....
9	"Oat Feed".....	Ogilvy Milling Co., Lt..... .	10·74	7·75	2·25	60·75	14·86	3·65
10	Gluten Meal.....	Edwardsburg Starch Co., Lt., Cardinal.	9·71	32·31	2·44	54·27	·74	·53
11	Gluten Feed.....	" " ..	8·31	25·38	2·17	58·31	5·30	·53
12	Corn Oil Cake	" " ..	7·89	22·25	15·69	43·51	8·90	1·78
13	Corn Bran.....	" " ..	8·15	9 12	3·23	67·05	12·05	·40
14	Gluten Meal	" " ..	8·72	36·69	3·36	.....	.....	....
15	Gluten Feed.....	" " ..	6·62	22·99	3·59	.....	.....	....
16	Corn Bran.....	" " ..	8·72	10·43	3·22	...	.....	....
17	Gluten Feed.....	" " ..	.....	22·75	2·03	.....	.....	....
18	"Gluten Meal"?.....	Brantford Starch Co., Brantford...	8·19	12·44	7·92	64·29	6·51	·65
19	Gluten Feed.....	Imperial Starch Co..... .	7·37	21·06	6·20	58·27	6·42	·68
20	Linseed or oil cake.....	Dom. Linseed Oil Co., Lt.....	.....	29·56	10·84	.....	... ..	....
21	" "	Can. Linseed Oil Mills, Lt.....	.....	32·12	6·41	.....	.....	....
22	Oil Cake Meal	Dom. Linseed Oil Co., Lt.....	.....	27·06	13·75	.. ...	.....	....
23	" "	Can. Linseed Oil Mills, Lt..... .	.....	31·62	9·98	.....	.....	....
24	Cotton-seed Meal.....	"Prime Bright," Broker C. A. Smith, St. John.	. ...	37·94	.....	....	.....	....
25	" "	"Second Bright," Broker C. A. Smith, St. John.	.....	19·94	.....	.. .	.....	....
26	" "	No. 1 Broker, Frank Oliver, Toronto	.....	39·88	8·97	. ....	. ....	....
27	" "	No. 2 Am. Cotton Oil Co.....	.....	41·25	7·80	.....	.....	....
28	Spirit Grains	G. & W., Toronto..... ...	4·05	29·06	6·32	48·54	10·76	1·27
29	Goose Wheat	A. W. Milne, Markham.....	11·25	12·50	1·90	70·78	1·81	1·76
30	Fall Wheat.....e....	" "	12·47	8·44	1·84	73·46	2·00	1·79
31	Soda Biscuits	Factory at London, Ont.....	5·35	9·31	13·68	69·12	·08	1·97
32	Rice Meal.....	B. C. Rice Mills.....	9·06	12·25	15·73	50·01	5·83	7·12

MIXED FEEDS.

Nos. 1, 2, 3 and 4.—These were forwarded by the Inspector of Live Stock Shipments, Montreal (Department of Marine and Fisheries) with a request for an analysis and report on their relative values. These feeds were intended for the use of cattle en route to England. They were found to consist essentially of crushed corn and oats. There is a general similarity between them, and the differences in nutritive values are not great, but a careful scrutiny of the data allows us to arrange the feeds in the following order of merit: First, No. 4, by reason of its higher protein and fat content; second, No. 1, and No. 3, which are practically equal, with a protein content essentially 1 per cent lower than that of No. 4; third, No. 2, which contains 2 per cent less protein than No. 4 and 1 per cent less than Nos. 1 and 3, and is the highest of the series in fibre.

Nos. 5, 6 and 7.—Products of the American Cereal Company, Peterboro, Ont. In the most important constituent, protein, the Victor Corn and Oat Feed and the Banner Cattle Food are identical. The latter, however, is somewhat the richer in fat and poorer in fibre, and consequently is the better feed, though the difference between the two in nutritive value would not be large. Though wholesome feeding stuffs, their

comparatively speaking low protein content precludes them from the list of high class 'concentrates.'

No. 7—Oat Hulls.—The analysis shows very well the practically worthless character of 'oat hulls,' when considered as a feed. It is difficult to understand how such a material can obtain purchasers, but the writer is informed that large quantities of this ground hulls and other waste from oatmeal and cereal mills find a ready sale among farmers and dairymen in various parts of the country at fairly good prices. There are, of course, different grades or qualities of such feeds, but in general they will be found very low in protein and high in fibre. They consequently occupy a position at the very bottom of the list of purchased feeds, and great judgment and knowledge of the comparative prices and feeding values are necessary in order to use them with profit. The 'mixed' feeds, of which there are now so many sold, give the miller an opportunity of disposing of hulls, sweepings, and other almost worthless material at prices far in excess of the feeding values.

No. 8.—'Mixed Feed,' sent by F. W. Davidson, Sussex, N.B., and quoted by I. N. Tilton, broker, St. John, at $30 per ton. It consists largely of cracked corn, bran and oat by-products, there being quite a large proportion of oat hulls. It is not a food of high quality and certainly is not worth the price quoted.

No. 9.—'Oat Feed,' sent by G. S. Kinnear, Sussex, N. B., and stated to be manufactured by the Ogilvy Milling Company. Its composition is said to be made up of ground oats and feed flour in equal proportions. A mechanical examination showed it to contain, approximately, 72 per cent fine meal and 28 per cent oat hulls. The analysis does not give it a high rating.

CORN BY-PRODUCTS—GLUTEN MEAL, ETC.

Nos. 10, 11, 12 and 13.—These are the by-products of the Edwardsburg Starch Company, Cardinal, Ont. The samples were sent by the company in January as representative of their various brands of feed. Their comparative feeding values may be easily arrived at by a consideration of the data for protein and fat. Gluten Feed is a mixed product, Gluten Meal and Corn Bran being the components.

Nos. 14, 15, and 16.—These are further samples of Gluten Feed and Corn Bran sent by the Edwardsburg Starch Company, in November, 1905.

No. 17.—Is a sample of Gluten Feed forwarded by P. G. Mills, Sussex, N.B., and stated to be manufactured by the Edwardsburg Starch Company.

No. 18.—'Gluten Meal,' forwarded by P. G. Mills, Sussex, N.B., and stated to be from the Brantford Starch Company. It is not gluten meal; indeed, it contains but little more than one-half the protein found in most gluten feeds.

No. 19.—Gluten Feed, submitted by Dwyer & Co., Ottawa, and stated to be a product of the Imperial Starch Company, Prescott, Ont. While having a slightly higher fat content than the Edwardsburg Gluten Feed, it is not quite so rich in protein.

LINSEED OR OIL CAKE AND MEAL.

Nos. 20, 21, 22, and 23.—These are linseed oil cakes and meals from the Dominion Linseed Oil Company, and the Canada Linseed Oil Mills, as stated in the table. They are all genuine and of good quality, though differing somewhat in their composition. The data of the protein and fat will allow the feeder to judge of their relative merits and greatly assist when considering their prices.

COTTON SEED MEAL.

Nos. 24, 25, 26, and 27.—Are Cotton seed meals. Nos. 24 and 25 were sent by F. W. Davidson, Sussex, N.B., who reported their prices at $30 and $27.25 per ton, respectively. The analyses show a much greater difference in feeding value than is indicated by $25 per ton. Nos. 26 and 27, also sent by F. W. Davidson, are of much better quality. They are quoted at $32.25 and $32.50 per ton, respectively.

SPIRIT GRAINS.

No. 28, 'Spirit Grains.'—A by-product from the distillery of Gooderham & Worts, Toronto. This is a feed of high value, being rich in both protein and fat. It ranks with oil cake, gluten meal and other concentrates in this respect.

GOOSE AND FALL WHEAT.

Nos. 29 and 30—Goose and Fall Wheats.—These were submitted by A. Ward Milne, Markham, with a view of obtaining data regarding their relative values for feeding purposes. The high protein content of the Goose Wheat makes it much the more valuable from this standpoint.

SODA BISCUITS.

No. 31—Broken Soda Biscuits.—These can frequently be obtained from biscuit factories at prices that permit of their being used as a feed for pigs, &c. The analysis shows a high fat content and a very fair percentage of protein. At the price quoted, $20 per ton, they are very good value.

RICE MEAL.

No. 32.—Rice Meal, sent by Chas. B. Jones, Colquitz, B.C., and said to be from the British Columbia Rice Mills. Price quoted $16 per ton. This is an excellent feed, particularly rich in fat and with a protein content equal to that of hard wheat.

CONDIMENTAL AND SO CALLED STOCK FOODS.

Inquiries are being constantly received as to the feeding value of these preparations, of which there are now a number upon the market. The claims made for these, it is only right to state, are not based simply upon the percentages of protein and fat present. It is urged that in addition to their food value they are appetizers, tonics, and assist in the digestion and assimilation of the rest of the ration; that they are in fact both food and medicine. It is for this reason that the analyses of those we have examined this year are not incorporated with those of the feeds already considered.

A few notes made from their chemical and microscopical examination may be added, though it is not claimed that all the herbs, roots and drugs present have been detected.

ANALYSIS *of* Condimental Foods.

——	Herbagium.	International Stock Food.	Anglo-Saxon Stock Food.	Sugar and Flax.
	p. c.	p. c.	p. c.	p. c.
Moisture	6·70	8·83	9·11	9·82
Protein	22·94	13·06	17·66	24·69
Fat	6·98	4·29	3·57	9·90
Carbohydrates	40·61	45·15	40·48	43·86
Fibre	7·86	11·97	10·80	6·56
Ash	14·91	16·70	12·83	5·17
Sulphur (free)	.....	.....	5·55	

Herbageum.—This consists essentially of linseed and wheat bran or some wheat refuse. Fenugreek, sugar, charcoal and salt are also present.

International Stock Food.—Its principal ingredient is a wheat feed. Salt, charcoal, and fenugreek were also detected and some bitter drug, probably gentian, also noted.

Anglo-Saxon Stock Food.—Largely linseed meal. It contains charcoal, salt, sulphur, fenugreek and probably gentian.

Sugar and Flax.—Its chief component is linseed meal. Fenugreek, charcoal and salt were also detected. Sugar is not present.

Our position with regard to these preparations is that all the ingredients are of a cheap character and the prices asked are altogether extravagant, whether they are to be regarded as foods or medicine, or both. Thus, the price of herbageum is $12 per hundred weight, and as a food its value cannot be equal to that of oil cake meal. We do not deny that such condimental foods may at times be useful, but we do not think their continued or general employment is either necessary or economical. It has been shown by careful experiment that animals in good health do not thrive any better from the addition of such 'tonics' to their food, and it seems only reasonable that it would be far cheaper and more rational to treat stock out of condition as their ailments require.

THE RELATIVE VALUE OF ROOTS.

In continuing the examination of field roots to learn their relative food value and the effect of seasonal conditions upon their composition, we have analysed this year 17 varieties of mangels, 20 varieties of turnips, and 11 varieties of carrots, all grown on the Central Experimental Farm.

Mangels.—The percentages of dry matter and sugar are, on the whole, considerably below those usually obtained here. This, we believe, is due to the somewhat abnormal character of the season, which was marked by high rainfall and high daily temperatures. Under these conditions the roots did not thoroughly mature and the storing up of sugar during September and October to a certain extent was interfered with. For the best results it is generally conceded that an ample though not excessive precipitation during the first three months of summer, with comparatively low temperatures, followed by a moderately dry, warm, but not too hot, ripening season (September and October) are the best conditions for the production of sugar in roots. The averages for 10 varieties analysed in 1904 were: dry matter, 11·69 per cent, sugar in juice, 6·62 per cent. This season, for 20 varieties we obtained: dry matter, 10·04 per cent, sugar in juice, 4·61 per cent.

ANALYSIS OF MANGELS, C.E.F., OTTAWA, ONT., 1905.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average weight of one Root.	
	p. c.	p. c.	p. c.	Lbs.	Oz.
Selected Mammoth Long Red	87·18	12·82	6·95	3	9
Yellow Intermediate	87·85	12·15	6·36	3	4
Gate Post	87·93	12·07	6·83	2	13
Leviathan Long Red	88·45	11·55	5·88	4	3
Half Long Sugar White	88·94	11·06	4·65	4	0
Giant Sugar	88·95	11·05	5·15	4	5
Half Long Sugar Rosy	89·63	10·37	5·07	2	15
Triumph Yellow Globe	89·87	10·13	4·86	4	10
Prize Mammoth Long Red	90·06	9·94	5·56	3	14
Giant Yellow Intermediate	90·09	9·91	3·88	4	2
Ideal	90·20	9·80	5·07	3	4
Mammoth Long Red	90·82	9·18	3·44	2	3
Giant Yellow Globe	91·36	8·64	3·55	3	12
Selected Yellow Globe	91·47	8·53	4·67	3	7
Mammoth Yellow Intermediate	91·83	8·17	3·45	4	3
Lion Yellow Intermediate	92·19	7.81	1·93	3	9
Prize Winner Yellow Globe	92·48	7·52	2·14	3	14
Average of 17 varieties	89·96	10·04	4·67	3	9

The varieties have been arranged in this table in the order of their 'dry matter' and sugar, beginning with the highest, and it will be noticed that between the first and last of the series vast differences occur. We do not think that the value of roots as part of the ration depends entirely on the percentages of dry matter and its sugar content, but we have no hesitation in saying that of two roots, the one containing 12·82 per cent dry matter with a sugar content of 6·95 per cent, the other with but 7·52 per cent dry matter and 2·14 per cent sugar, the former must be much the more valuable feed. This important matter has been called attention to in former reports and is again emphasized that farmers in choosing their varieties of mangels may consider not only yield per acre, but also the composition of the roots. It is not at all probable that the same order as here given will be preserved for any two successive seasons, but the data presented bear an added importance when it is remembered that all these mangels were grown under the same climatic and cultural conditions. The 'breed' factor has been investigated for a number of years past by us, using two varieties of mangels (see the following chapter) and the results clearly show that despite changes due to season, &c., each variety has held its own relative position for six seasons.

Turnips.—The differences in composition are not so great as with mangels, and this fact serves to bring the averages of the dry matter of these two classes of field roots very close together. In sugar content, however, the turnip is distinctly inferior to mangels. This season, as with all classes of roots grown here, the percentage of sugar is below the average.

ANALYSIS OF TURNIPS, C.E.F., OTTAWA, ONT., 1905.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average weight of one Root.
	p. c.	p. c.	p. c.	Lbs. Oz.
Mammoth Clyde	88·49	11·51	1·52	2 7
Sutton's Champion	88·54	11·46	1·01	2 11
Hartley's Bronze	88·80	11·20	1·01	1 13
New Century	89·10	10·90	1·01	2 9
Selected Purple Top	89·21	10·79	0·50	2 14
Imperial Swede	89·29	10·71	1·11	2 8
Kangaroo	89·34	10·66	1·02	2 14
East Lothian	89·78	10·22	0·91	3 1
Elephant's Master	90·00	10·00	1·22	3 0
Skirvings	90·09	9·91	1·32	3 9
Bangholm Selected	90·10	9·90	1·42	2 5
Halewood's Bronze Top	90·10	9·90	0·91	2 5
Magnum Bonum	90·17	9·83	1·01	3 8
Perfection Swede	90·19	9·81	1·01	2 11
Drummond Purple Top	90·21	9·79	0·81	3 13
Good Luck	90·64	9·36	1·21	3 9
Carter's Elephant	90·72	9·28	0·81	3 2
Jumbo	91·08	8·92	1·31	3 6
Emperor Swede	91·18	8·82	1·12	3 9
Hall's Westbury	91·19	8·81	1·83	2 3
Average of 20 varieties	89·91	10·09	1·10	2 13

With this greater uniformity in composition there is not the same necessity in selecting turnips as with mangels, and yield per acre and keeping qualities become the chief factors to consider.

Carrots.—On the whole, carrots are slightly higher in dry matter than turnips, and in regard to sugar content occupy a middle place between mangels and turnips. The differences between the varieties while not so great as with the mangels, are larger than those noticed in the varieties of turnips.

ANALYSIS OF CARROTS, C.E.F., OTTAWA, ONT., 1905.

Variety.	Water.	Dry Matter.	Sugar in Juice.	Average Weight of one Root.
	p. c.	p. c.	p. c.	Lbs. Oz.
White Belgian	87·46	12·54	3·63	1 1
Half Long Chantenay	88·53	11·47	3·64	0 14
Kos Kirches	89·21	10·79	3·44	1 2
Carter's Orange Giant	89·43	10·57	2·02	1 3
Improved Short White	89·65	10·35	2·14	1 7
Ontario Champion	89·82	10·18	2·53	1 1
Mammoth White Intermediate	89·85	10·15	2·95	1 4
Early Gem	90·39	9·61	1·92	0 14
Long Yellow Stump-rooted	90·63	9·37	2·44	1 10
Giant White Vosges	90·96	9·04	1·52	1 3
New White Intermediate	91·35	8·65	1·53	1 4
Average of 11 varieties	89·75	10·25	2·52	1 3

INFLUENCE OF INHERITED QUALITIES.

The composition of roots is influenced by various factors, chief among which are the character of the season as regards rainfall and temperature, and the relative richness of the soil. Quality in roots, however, as evidenced by the percentage of 'dry matter' and sugar is in part inherited. For the past six years we have analysed two varieties, the Gate Post and Giant Yellow Globe grown side by side, on land of the same character and, necessarily, under the same climatic conditions, and the results indicate that 'breed' in mangels is a factor of considerable importance.

DRY MATTER AND SUGAR IN GATE POST AND YELLOW GLOBE MANGELS.

Season of Growth.	Gate Post.		Giant Yellow Globe.	
	Dry Matter.	Sugar in Juice.	Dry Matter.	Sugar in Juice.
	p. c.	p. c.	p. c.	p. c.
1900	11·14	6·15	8·19	2·64
1901	9·41	4·15	9·10	4·08
1902	13·90	9·39	10·24	5·24
1903	12·93	7·38	10·89	6·17
1904	12·64	7·62	9·24	5·26
1905	12·07	6·83	8·64	3·55
Average of 6 years 1900-05	12·01	6·92	9·38	4·49

Though the data for neither of these roots show great regularity or uniformity, due chiefly, I believe, to varying seasonal conditions, a well marked and always present difference is to be observed between these mangels as regards their percentages of dry matter and sugar. We have already observed that the past season at Ottawa was not one favourable to sugar production, and this, I think, may account for the fact that both varieties have given low returns this year. However, this does not affect in any way the general results or the conclusions drawn from previous years' work in this matter, viz., that the Gate Post is the richer of the two, both as to dry matter and sugar. The difference between these varieties, as far as it can be ascertained by chemical analysis, shows that weight for weight the Gate Post should be worth between one-third and one-fourth more than the Giant Yellow Globe for feeding purposes.

SUGAR BEETS, FOR FACTORY PURPOSES.

The three varieties of sugar beets principally used for sugar extraction, Vilmorin's Improved, Klein Wanzleben and Très Riche (French 'Very Rich') as grown on the Dominion Experimental Farms during the past season have been analysed. By reference to the reports of this Division it will be seen that this investigation has been carried on, practically, since the establishment of the Farms, so that now we have on record considerable evidence as to the richness and purity of sugar beets as grown in Canada under varying climatic or seasonal conditions.

SUGAR BEETS GROWN ON THE DOMINION EXPERIMENTAL FARMS, 1905.

Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of one Root.	
					Lbs.	Oz.
Vilmorin's Improved.....	Nappan, N.S.....	15·39	18·77	82·0	0	14
"	Ottawa, Ont.....	12·00	15·37	78·1	1	0
"	Brandon, Man.....	10·70	14·43	74·2	1	15
"	Indian Head, Sask.....	15·13	17·86	84·7	1	14
"	Agassiz, B.C.....	17·14	21·06	81·3	1	2
Klein Wanzleben	Nappan, N.S.....	17·86	20·63	86·5	0	13
"	Ottawa, Ont.....	13·34	13·95	95·6	1	14
"	Brandon, Man	10·57	15·03	70·3	2	12
"	Indian Head, Sask.....	16·35	19·28	84·8	1	14
"	Agassiz, B.C.....	17·26	19·97	86·5	1	1
Très Riche (French 'Very Rich')	Nappan, N.S.....	16·31	19·70	82·3	0	13
"	Ottawa, Ont.....	12·00	14·40	83·3	1	4
"	Brandon, Man	11·99	15·83	75·7	2	12
"	Indian Head, Sask.....	13·34	17·26	77·2	1	15
"	Agassiz, B.C.....	17·56	20·20	86·9	1	3

The best results have been obtained on the Experimental Farm at Agassiz, B. C., and at Nappan, N.S., closely followed by those at Indian Head. In all three instances the data indicate a good quality of factory beets from which sugar could be profitably extracted.

At Ottawa the percentage of sugar and co-efficient of purity are considerably lower than those usually obtained.

This I believe is due, if not entirely, certainly in a very large measure, to the abnormal climatic conditions that obtained here during the past season. In the first place, the rainfall (13·45 inches) during June, July, and August was somewhat greater than the average. This was followed by a precipitation of 5·31 inches during September and October, an amount not less than usual for these months. In conjunction with this ample supply of moisture we find certain and notable peculiarities of temperature, as follows: Exceptionally high maximum temperatures, and unusually low minimum temperature for the summer months, May, June, July, August, September, and October. This naturally means sudden and great changes in temperature, or in other words, speaking generally, hot days and cool nights. Bearing these facts in mind and remembering that ideal climatic conditions for sugar-production include a moderate and well distributed rainfall during May, June, July, and August, with fairly dry weather in September and October, when the beets are maturing; and, further, that a low mean summer temperature, say 60°F., with few sudden or great changes in the latter part of the season, are specially conducive to a high sugar content, the explanation of the poor results obtained this year is not difficult to find.

At Brandon, Man., the beets are the poorest of the series. This may in part be due to unfavourable weather for sugar accumulation during the ripening of the roots, but the large size to which the beets have grown, considerably over 2 lbs. each in weight, is certainly against a high sugar content.

CHEMISTRY OF INSECTICIDES AND FUNGICIDES.

SODA-BORDEAUX OR BURGUNDY MIXTURE.

During June and July of the present year a number of reports were received, both from Ontario and Quebec, stating that serious injury had resulted from the use of Soda Bordeaux on apples, plums, cherries and peaches—in some instances the trees being entirely defoliated. These communications were accompanied by requests for information regarding this newly introduced mixture, in which washing soda is substituted for lime.

Soda-Bordeaux, which has been used successfully on potatoes for blight and rot, may be prepared according to one or other of the following formulæ:—

	A.	B.
Copper sulphate (Blue stone)	6 lbs.	4 lbs.
Carbonate of soda (washing soda)	7½ "	5 "
Water	40 gals.	40 gals.

The proportion of bluestone to washing soda is the same in each, but 'A' is naturally the stronger spray.

Though, as far as the writer can learn, Soda-Bordeaux mixture had not been suggested for fruit trees, its use being mainly for potatoes, there appeared no reason why it should prove injurious for orchard work. The explanation was furnished, when upon further inquiry it was learnt that in every authenticated case in which injury had been reported, Paris green, white arsenic or some other arsenical compound had been added to the mixture. When Paris green is added to ordinary (lime) Bordeaux it is not dissolved, but remains in suspension, and experience has shown that no injury to foliage or fruit results from the use of such a spray. When, however, Paris green is added to Burgundy mixture it is partly dissolved (owing to the excess of washing soda present) and becomes an active arsenical compound more or less corrosive to foliage. It has long been known that soluble arsenical compounds have this injurious effect and that consequently they cannot be used in insecticidal mixtures. Paris green, arsenite of soda, and white arsenic were all reported as having been added to the Burgundy mixture; all of these would render the spray extremely injurious.

As it seemed desirable to furnish experimental proof on this subject and since certain correspondents claimed that Burgundy mixture containing Paris green had been used with impunity on fruit trees, a series of trials were made in the orchards of the Experimental Farm, Ottawa, on apples, cherries and plums. In the absence of the Horticulturist, these experiments were planned and carried through by myself. The spraying mixtures were as follows:—

'A'—SODA-BORDEAUX.

Copper sulphate (bluestone)	4 lbs.
Carbonate of soda (washing soda)	5 lbs.
Water	40 gals.

The bluestone and washing soda were dissolved separately in half the total volume of water and the resultant solutions mixed. This mixture, it will be observed, contains no Paris green or arsenic in any form.

'B.'—Soda-Bordeaux, as above, but to which 4 ounces of Paris green had been added.

'C.'—Soda-Bordeaux, as above, but to which a solution of arsenite of soda (formed by boiling 8 ounces white arsenic and 2 lbs. washing soda with 1 gallon of water) had been added.

RESULTS AND CONCLUSIONS.

Soda-Bordeaux.—(Spray 'A'):—After two sprayings there was no apparent injury to the foliage of apples, plums and cherries.

Soda-Boraeaux with Paris green.—(Spray 'B'):—Leaves of apple slightly scorched at edges. Varieties were found to differ in their resisting power to the corrosive action of this spray, but the results indicate that its use would be attended with a considerable degree of danger in the apple orchard.

The foliage of plums was decidedly scorched, though the injury was not very serious.

The cherries used in the experiment had their foliage slightly scorched. It was evident that this spray could not be used on the cherry with safety.

Soda-Bordeaux with Arsenite of Soda (Spray 'C').—This mixture caused excessive injury on apples, plums, and cherries. The foliage in every instance was scorched, subsequently becoming crisp and falling off. The damage was such as to show conclusively that this spray is dangerous in the highest degree for all classes of fruit trees.

In a word, Burgundy mixture, pure and simple, has shown itself as far as our experiments have gone, to be non-injurious to foliage. The addition of Paris green or other arsenite, however, renders the spray corrosive and therefore dangerous for orchard use.

When it is desired to use Paris green as an insecticide in the spray only Bordeaux mixture made with lime should be employed.

NEW FORMS OF KEROSENE EMULSION.*

The desirability of obtaining emulsifying materials other than the solution of whale oil or soft soap, materials that would not only lessen the expense of the spray, but at the same time obviate the necessity of the application of heat, led Professor Close, of the Delaware Experiment Station, to experiment with lime as an agent to hold the kerosene in suspension. This Lime-kerosene emulsion, prepared according to directions, is very fairly stable, homogeneous, one easy to spray and one which does not clog the nozzle. Briefly described, Prof. Close's directions are as follows: Mix into a 'thin,' sloppy mass 1 lb. of Limoid (an American preparation for the purpose) or the same quantity of good, freshly slaked lime with 1 quart of kerosene. For an approximately ten per cent emulsion, two gallons of water (Imperial measure) are then added and the whole emulsified by churning, say, for 5 minutes, best effected by means of a pump and a coarse nozzle. No free kerosene, he states, will appear for several weeks, and though there may be a separation on standing into limey layers, these will readily, if stirred, again produce the emulsion without deterioration.

Lime Emulsion.—Since 'Limoid' was specially recommended and was not obtainable in Canada, and numerous inquiries were being received as to the value of lime for this purpose, a number of experiments were made in the farm laboratories from the results of which the following important conclusions were drawn.

1. Freshly slaked lime makes a smoother and more lasting emulsion than ordinary air-slaked lime—the latter, however, will make a satisfactory emulsion if it is not too much carbonated by long exposure to the air.

2. By employing lime slaked immediately before using, the quantity may be materially reduced. A perfect emulsion can be made by slaking ½ lb. of good quick lime and emulsifying with 1 quart of kerosene and 2 gallons of water. This makes an approximately 11 per cent emulsion, suitable for Aphis.

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*This investigation was made at the suggestion and with the co-operation of Mr. W. T. Macoun, the Horticulturist, to whom my thanks are due for much valuable advice and assistance.

3. By the use of freshly slaked lime less time is needed for the churning in order to bring the mass to a perfect emulsion. Two to three minutes of vigorous, continuous pumping were found sufficient.

4. It is not apparently a matter of much moment that the lime be dry when mixed with the kerosene. Excellent emulsions have been made when the slaked lime has been quite moist or even made into a thick cream with water before adding the kerosene.

Flour Emulsion.—It occurred to the writer that as good quicklime was not always obtainable at a moment's notice, it would be well to ascertain if flour—to be had everywhere—would not answer equally well. Our experiments showed that flour could be successfully substituted for lime in making the emulsion when desired for immediate use. One pound to 1 quart of kerosene makes a perfect emulsion, as in the case of the lime, but 8 ounces were subsequently found sufficient to hold in perfect suspension the quart of kerosene.

The preparation with flour is very simple. The requisite amount of kerosene is placed in the vessel (pail or barrel), which is preferably dry, and flour added in the proportion stated, viz.: 8 ounces to 1 quart, the mass thoroughly stirred and the water added—2 gallons for every quart of kerosene. This is then vigorously churned, as already described, say, for 5 minutes, and the emulsion is ready for use.

It was further found that by scalding the flour a less weight is required. An excellent emulsion which did not show the slightest separation of kerosene after one week was prepared by scalding 2 ozs. of flour, mixing the resulting thin paste with 1 quart of kerosene and emulsifying with 2 gallons of water.

The flour emulsion is smooth, easily atomized, and does not clog the nozzle. Any separation into layers may be easily remedied by simply stirring or shaking the mixture. It is equally effective, we believe, as an insecticide with the lime-formed emulsion, and amongst other advantages that may be claimed for it is the fact that there is no perceptible whitening of the foliage, and, further, that in some places it will be found cheaper and easier to make than the lime emulsion. Its use is suggested as an alternative when good lime is unobtainable—when the emulsion is for immediate use and when intended for ornamental trees and shrubs, upon which the whitening of the foliage is objectionable.

FORMALIN—FORMALDEHYDE 40 PER CENT.

The amount of Formalin used in the treatment of grain, especially wheat and oats, for the prevention of smut, increases yearly and very rapidly. In Manitoba and the North-west generally it has already very largely replaced bluestone, due no doubt in a measure to the ease with which the solution may be prepared—simple dilution being all that is necessary. The results of the Formalin treatment have been highly satisfactory, and there is ample proof that Formalin is a most efficient smut destroyer. It has been used in two strengths: 3 ozs. to 10 gallons (2 parts in 1,000), and 4½ ozs. to 10 gallons (3 parts to 1,000). The seed grain is either thoroughly sprinkled or immersed for 5 minutes. In the majority of cases, and save perhaps with very badly affected grain, the weaker solution has proved as effective as the stronger, and thorough sprinkling equally satisfactory with immersion. In addition to ascertaining the strength of several brands of formalin on the market, we have endeavoured this year to learn if formalin, which had become milky through age, had lost its efficiency, wholly or in part, and if such altered (polymerized) formalin injuriously affected the germ of the grain. These were questions asked by several correspondents in the North-west last spring. A further enquiry was as to the effect of the formalin treatment on the vitality of wheat as compared with that of bluestone.

ANALYSIS OF FORMALDEHYDES.

	Percentage of Formaldehyde by weight.
No. 1. From Fulford-Leonard Drug Co., Brandon, Man. (clear).	38·0
No. 2. From Halpins Drug Store, Brandon, Man. (clear)	38·9
No. 3. From Clement Drug Store, Brandon, Man. (milky through polymerization)	38·7
No. 4. From Fleming's Drug Store, Brandon, Man. (milky through polymerization)	38·9
No. 5. From Cereal Division, C.E.F.	38·5
No. 6. From The Chemists and Surgeons Supply Co., Montreal.	37·9
No. 7. Scherings Formalin, very old and badly polymerized sample	46·4
No. 8. Scherings Formalin, very old and badly polymerized sample	34·4

These results, generally, are slightly higher than those obtained in 1903. Though it is not advisable to draw hard and fast conclusions from a few samples, the data indicate that there is considerable uniformity in strength among the brands found upon the market. Samples No. 7 and 8 were taken from the same bottle, which had been in the Farm Laboratory for more than 5 years; the formalin had become quite pasty through polymerization. The thinner portion gave 34·4 per cent; the thicker 46·4 per cent formaldehyde.

Slight polymerization, as in samples 3 and 4, does not apparently affect the analytical determination; excessive polymerization evidently interferes with the estimation.

So far our analyses have not detected any wilful adulteration or material falling off in strength.

ACTION OF FORMALIN ON THE VITALITY OF WHEAT.

For this purpose we used two samples of Red Fife wheat kindly furnished by Mr. Bedford, Superintendent of the Experimental Farm, Brandon, Man. He writes:—

'The 1904 sample is very smutty and is also badly rusted. Some think that rusted grain is so weak in germination that formalin or bluestone will kill the germ and for that reason do not treat it for smut. Information as to this will be gratefully received by western farmers. The 1902 wheat has not so much smut and is not rusted.' In the following table the treatment of these wheats is detailed, together with the results of the vitality test.

	Percentage of Vitality.	
	1902. Wheat.	1904. Wheat.
Untreated	91	98
Formalin, fresh, 4½ ozs. to 10 gals	66	86
" polmerized, 4½ ozs. to 10 gals	71	92
" fresh, 9 ozs. to 10 gals	69	72
Bluestone, 1 lb. to 2½ gals		63

(The treated wheats were immersed for 5 minutes, dried by exposure to the air, and tested at once as to vitality).

The results, it must be admitted, are not altogether satisfactory; the work must be repeated before any final conclusion can be reached and any definite statement made on several of the points under discussion. There are one or two deductions, however, that I think may safely be made, as follows:—

The formalin treatment lowers the percentage of vitality; the effect being more noticeable on the older (1902) wheat. In one instance the stronger solution (9½ ozs. to 10 gals.) reduced the vitality to a greater degree than the weaker solution; further work will probably confirm this result. Investigations carried on in the Farm laboratory in 1890-93 showed that bluestone similarly affected the vitality of the wheat; the stronger the solution, the more injury to the grain germ.

Milky or slightly polymerized formaldehyde is apparently less injurious to the germ than the fresh material, but it is only with the 1904 wheat that the difference is well marked.

Some years ago, the writer showed that bluestone *continues* to act injuriously upon the germ of the wheat, and therefore, that it was highly desirable that the grain should be sown as soon as possible after treatment. The same is no doubt true in the case of the formalin treatment. In this connection, Dr. Chas. E. Saunders, Cerealist, C.E.F., has furnished me with some valuable data that he recently obtained. He states that in the case of wheat, oats, and barley, the seed being treated with formalin solution 9 ozs. to 10 gallons, the vitality of the treated grains was after 11 months found to have been entirely destroyed. To study further this 'after effect' of formalin, samples of the treated wheats have been preserved and will be examined from time to time as to vitality.

It is of interest to note that the formalin treatment was not so severe on the life of the germ as the bluestone solution. It is quite possible, of course, that a more dilute solution of bluestone, say, 1 lb. to 5 gallons, would have been equally efficacious in destroying smut and less injurious to the wheat.

It does not appear that the vitality of the wheat (1904) had been impaired or weakened by the rust. It is not, therefore, advisable to neglect the treatment of grain simply on the count that it is rusted.

MILKY (POLYMERIZED) FORMALDEHYDE AS A SMUT PREVENTIVE.

In order to ascertain the relative values of the various treatments in smut prevention, samples of these treated grains (with the exception of those from the solution 9 ozs. to 10 gallons) were sent to the Experimental Farm at Brandon, Man., to be sown. They were sown in rows 6 inches apart and 30 inches long. Under date of August 28 Mr. Bedford writes: 'I have carefully gone over all the grain you sent me for smut test and I find that there are 159 smutty heads in the lot marked '1904, untreated,' but not a solitary smutty head in any of the others."

From this it might be concluded that all the treatments had been equally efficacious. There is this unsatisfactory feature, however, about the results, that the untreated 1902 sample, which contained a slight amount of smut, gave no sign of smut in the plot.

Slight polymerization of the formalin, as indicated by milkiness, does not apparently materially affect the virtue of the material for the destruction of smut, but it will be necessary to repeat this work another season before making any definite statement on this point.

CYANIDE FOR FUMIGATION PURPOSES.

It is a matter of considerable importance that the quality or strength of the cyanide used in the fumigation of plants and shrubs for the destruction of the San José scale should not fall below that called for. The value of this chemical so used is entirely dependent upon the amount of hydrocyanic acid gas evolved on the addition of acid.

The examination of a number of samples of 'potassium cyanide' in 1902, showed that at that time considerable differences in strength, *i.e.,* hydrocyanic acid content,

existed between the various brands upon the market. It was, further, made clear that much of the so-called potassic cyanide was sodic cyanide. From the standpoint of an insecticide, however, this latter fact has no significance, the percentage of hydrocyanic acid alone, as has been stated, determining the value of any particular sample.*

Last March two samples, submitted by the Entomological Division, were examined, the analysis furnishing the following data:

	Hydrocyanic acid, Per cent.
'A.' 'Pot cyanide 98-100 per cent,' as supplied to St. John N.B. Fumigation Station, 1904..	36·41
'B.' 'Cyanide of potash, C.P.', Henderson Bros., Lt...	42·71

Analysis showed 'A' to be practically potassium cyanide: sample 'B' contains no potassium and is exclusively sodium cyanide. The values of these samples are indicated by the percentages of hydrocyanic acid stated; in other words, 100 ounces of 'B' are equivalent to 117 ounces of 'A' in gas producing power.

WELL WATERS FROM FARM HOMESTEADS.

The examination of well waters from farmers has proved one of the most popular and directly useful features of our work. The danger that exists when the water supply is polluted is now widely known and every year finds a larger proportion of our rural population impressed with the fact that there is a very real and intimate relationship between good water and good health.

As we have shown again and again, the barnyard and back door wells are the sources above all others to be feared. Such are a dangerous convenience and not infrequently the cause of much ill health in the farmer's family. Every phase of the pure water question has, however, been discussed fully in past reports, and it only seems necessary to add now that assistance will continue to be given in this matter of water analysis to farmers and dairymen desiring it. We cannot, however, undertake water analyses for municipalities, villages, and towns. Requests for such work should be referred by the local health authorities to the Provincial Board of Health.

Instructions for the collection and shipment of water samples are forwarded on application.

Of the 118 samples of water received during 1905, 83 were submitted to analysis, the remainder being rejected by reason of insufficient quantity, dirty containing vessels or corks. By grouping the results of those examined, we find that 22 were reported as safe and wholesome, 38 seriously polluted, 12 suspicious and probably unsafe for drinking purposes, and 11 saline in character.

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* See page 151 et seq. Report of the Chemist of the Experimental Farms for 1902.

ANALYSES OF WELL WATERS, 1905.

RESULTS STATED IN PARTS PER MILLION.

Number.	Locality	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphate.	Report.
			1904.									
1	Calgary, Alta.....	T. A.....	Dec. 5	·275	2·0	·73	5·0	592·0	364·0	228·0	.....	Unsafe to use for drink'g purposes.
			1905.									
2	Carstairs, Alta.	Dr. A. R ...	Jan. 3	·135	·382	·078	8·0	692·0	516·0	176·0	V. hvy. trs.	Very suspicious.
3	Carleton Place, Ont.....	W. B. McA....	" 11	Free.	·085	2·561	8·0	319·2	269·6	49·6	Slight trcs..	Suspicious.
4	Rouleau, Assa.....	W. H. J.....	" 16	·09	1·38	33·72	200·0	8937·0	7966·0	971·0	.....	Strongly saline.
5	Longlaketon, Assa.....	W. L. W....	" 23	·04	·08	·245	9·0	719·2	553·6	165·6	None....	Free from pollution.
6	Medora, Man.....	A. N. M.....	Feb. 20	4·70	·625	None.	801·0	4676·0	4341·2	334·8	"	Saline water.
7	Lefroy, Ont	W. R.....	" 24	·01	·155	·42	6·1	242·0	147·2	94·8	"	Fairly good water.
8	Salisbury, N.B.....	P. J. G	" 24	·192	·330	·212	92·5	542 0	390·0	152·0	Slight trcs..	Dangerously polluted.
9	Salisbury, N.B	J. W. P.....	" 24	None.	·294	3 963	23 5	240·0	155·0	85·0	V. hvy. trs.	Very suspicious.
10	Morrison Lake, Ont....	C. H	Mar. 10	·65	·30	.....	None.	113·0	58·0	55·0	None.....	Rather suspicious.
11	Lennoxville, Que.....	F. W. F.....	" 16	None.	·13	055	None.	111·2	69·6	41·6	"	Wholesome.
12	Balmoral, Ont.....	G. H. R.....	Apr. 10	1·59	2·46	2·45	38·0	1187·0	834·0	243·0	Heavy trs..	Very seriously polluted.
13	Calumet, Que.....	R. L.....	" 11	None.	·05	None.	2·5	255·2	217·2	38·0	None.....	Perfectly safe and wholesome.
14	Rockliffe, Ont.....	W. H S.....	" 20	·06	·06	16·61	22·0	407·2	314·4	92·8	Heavy trs..	Seriously contaminated
15	Campbell's Bay, Que....	E. H. W.....	" 22	Free.	·285	7·20	32·0	550·8	414·8	136·0	Free.....	Contaminated with drainage mat'r.
16	Ottawa, Ont.....	G. C. E	" 29	Free.	·10	4·61	16·25	310·0	224·8	85·2	"	Suspicious.
17	Meach's Lake, Ont	N. J. K.....	May 2	·01	·295	·0082	.....	68·4	38·4	30·0	None.....	Unpolluted.
18	Pile Hill, Assa.....	W. M. G.....	" 2	·016	·88	8·668	65·0	2855·6	2171·2	684·4	Heavy trs..	Strongly saline.
19	Sutton, Que.....	A. G. E. No. 1.	" 6	·01	·095	·758	Free.	29·6	20·0	9·6	Free.....	Pure and wholesome.
20	" "	A. G. E. No. 2.	" 6	·01	·115	1·62	Free.	54·0	32·4	21·6	"	" "
21	Lennoxville, Que.....	H. A.....	" 16	·008	·235	·059	None.	132·0	96·8	35·2	Traces..	Excellent water.
22	Broomhill, Man.	W. K.....	" 25	·008	·208	·059	1·0	387·2	283·2	104·0	None.....	Unpolluted with drainage.
23	Murray Harbor South, P.E.I.	W. S. H. No. 1.	June 2	·03	·268	11·264	98·0	416·8	344·0	72·8	Traces.. .	Seriously polluted.
24	" " "	" " 2.	" 2	1·62	·757	1·352	190·0	1126·8	775·6	351·2	Heavy trcs.	" "
25	" " "	" " 3.	" 2	·048	·075	22·517	60·0	213·6	148·0	65·6	.. ..	" "
26	Calgary, Alta.....	J. S. D.....	" 6	Free.	·425	Free.	14·5	3047·6	2461·6	286·0	Free.....	Saline water.
27	Meadowvale, N.S.....	M. S.	" 12	·01	·095	2·255	7·8	66·4	26·8	39·6	Traces.. .. .	Rather suspicious.
28	Balaclava, Ont.....	J. E.....	" 20	·215	·270	·523	7·5	412·0	308·0	104·0	"	Dangerously polluted.

ANALYSIS OF WELL WATERS, 1905—*Concluded.*

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
			1905.									
29	Cascades, Que	F. F. D.	July 17	None.	·1167	2·475	1·2	88·0	24·0	64·0	None	Quite safe for drinking purposes.
30	Penhold, Alta	J. S.	" 19	·26	·23	None.	10·0	1112·0	972·8	139·2	"	Rather suspicious.
31	St. Stephen, N.B.	C. M. V. No. 1.	" 19	None.	·16	25·6	123·0	638·4	515·2	123·2	"	Dangerously polluted.
32	"	" No. 2.	" 19	"	·02	·14	5·8	41·6	24·8	16·8	"	Free from pollution.
33	St. Victor d'Alfred, Ont.	W. G.	" 22	8·425	·98	·374	15204·4	12416·0	2788·4	8000·0	Heavy trace.	Saline water.
34	Pointe de Bute, N.B.	C. F.	" 22	·18	·225	·326	5·0	50·0	18·0	32·0	None	Seriously contaminated.
35	Indian Head, Sask.	R. M. B.	" 29	·665	·71	2·818	800·0	8434·0	6399·0	2035·0	Trace.	Saline water.
36	Maitland, N.S.	G. L. S.	Aug. 10	Free.	·04	·823	7·0	856·0	676·0	180·0	Traces	Suspicious.
37	Cassel, Ont.	H. B.	" 21	·17	·07	·09	2·8	514·8	400·8	114·0	"	"
38	Disley, Assa	W. T. A.	" 24	·29	1·44	1·103	365·0	13840 4	10987·2	2853·2	None	Saline water.
39	Ingonish, N.S	H. C. C.	" 28	·235	·06	·07	25·0	2377·6	1910·0	467·6	Slight trace.	"
40	Mather, Man.	J. A. F.	" 29	4·355	·415	1·062	320·0	5950·0	4644·0	1306·0	Traces	"
41	Ottawa East, Ont.	J. B. No. 1.	" 31	·67	·215	·346	2·8	200·0	140·0	60·0	Trace.	Seriously polluted.
42	"	" No. 2.	" 31	·01	·185	·37	1·5	196·4	107·6	88·8	Free	A good water.
43	Ottawa, Ont.	N. J. K. No. 1.	" 31	·01	·22	·1	·6	62·9	36·4	26·5	V. S. trace.	Free from contamination.
44	"	" No. 2.	" 31	·01	·215	·115	·6	59·6	34·4	25·2	"	" "
45	"	" No. 3.	" 31	·01	·22	·107	·5	56·0	36·0	20·0	"	" "
46	"	" No. 4.	" 31	·01	·255	·108	·6	57·6	32·4	25·2	"	" "
47	Ottawa East, Ont.	J. B. No. 1.	Sept. 5	·65	·225	·292	2·5	227·6	153·6	74·0	"	Unfit for drinking purposes.
48	"	" No. 2.	" 5	·635	·205	·416	2·5	206·4	134·4	72·0	Slight trace.	" "
49	Cheneville, Que.	J. F.	" 8	·42	·26	3·42	14·5	135·0	92·0	43·0	Trace.	Seriously polluted.
50	L'Ange Guardien, Que.	F. A.	" 9	None.	·45	3·23	1200·0	2848·0	2555·0	293·0	V. H. trace.	Saline water.
51	Brooklin, Ont.	H. B.	" 14	·01	·16	1·45	39·5	497·6	310·0	187·6	Traces	Very suspicious.
52	Kingsmere, Ont.	J. G. G. No. 1.	" 20	None.	·07	1·54	·25	134·0	76·4	57·6	"	Free from pollution.
53	"	" No. 2.	" 20	"	·22	·813	·66	36·0	.....	.....	None	Excellent water.
54	Summerside, P.E.I.	J. S. A.	" 21	·04	·095	8·71	52·5	412·4	318·4	94·0	Traces.	Very suspicious.
55	Enderby, B.C	G. H. No. 1.	" 26	None.	·16	None.	None.	280·0	176·0	44·0	V. S. trace.	Wholesome.
56	"	" No. 2.	" 26	·39	·185	"	12·0	1392·0	1104·0	288·0	Traces	Seriously polluted.
57	"	" No. 3.	" 26	·01	·095	·012	4·0	673·0	453·0	218·0	None	Excellent water.
58	Richmond, Ont.	W. A. H.	" 29	·20	·14	1·111	50·0	524·0	300·4	223·6	Traces	Seriously polluted.
59	Edmundston, N.B	C. G. M.	Oct. 2	Free.	·185	·0823	1·0	72·8	35·2	37·6	None	Free from pollution.
60	Panmure, Ont.	T. O'K.	" 5	·195	·135	None.	41·0	472·0	399·0	73·0	"	Contaminated.
61	Carleton Place, Ont.	M. A. McF.	" 7	Free.	·095	3·08	12·75	325·2	225·6	99·6	Heavy trace.	Probably contaminated.
62	Cobden, Ont.	T. B.	" 12	·09	·17	10·22	155 0	1031·2	529·6	501·6	Traces.	Extremely bad water.
63	"	R. A. B.	" 12	·01	·195	9·61	20·0	402 8	248·4	154·4	"	Unfit for drinking purposes.
64	"	J. A.	" 12	·03	·13	12·15	202·5	1025·2	661·2	364·0	Heavy trace.	Very seriously polluted.

65	"	Dr. McL.	"	12	·13	·11	4·19	31·0	428·0	248·0	180·0	Traces	Dangerously polluted.
66	"	A. McB	"	12	·135	·185	45·32	182·5	1180·0	681·6	498·4	Heavy trace.	Extremely bad water.
67	Port Perry, Ont.	J. W.	"	16	·215	·38	·0618	118·0	794·4	562·4	232 0	Traces	Exceedingly bad water.
68	Alexander, Man	A. G. G.	"	19	·87	1·19	·214	132·5	20603·0	15885·0	4718·0	Heavy trace.	Saline water.
69	Cobden, Ont.	J. M. C.	"	27	·06	·255	6·905	60·0					Seriously polluted.
70	"	R. A.	"	27	·08	·06	·098	5·0					Unpolluted.
71	"	J. P.	"	27	·04	·37	33·15	210·0					Seriously polluted.
72	"	A. McD.	"	27	·11	·40	28·07	150·0					"
73	"	C. B. M.	"	27	Free.	·055	15·77	40·0					"
75	"	W. B. D.	"	27	·05	·28	40·95	110·0					"
76	"	C. L. T.	"	27	·02	·24	43·63	210·0					"
77	"	J. H.	"	27	·05	·25	28·61	45·0					"
78	"	F. S.	"	27	·044	·105	36·86	110·0					"
79	"	A. McL.	"	27	Free.	·11	17·29	25·0					"
80	"	W. B.	"	27	·215	·24	38·12	110·0					"
81	"	E. T	"	27	Free.	·24	39·15	150·0					"
82	Fallowfield, Ont	J. M.	Nov.	3	·13	·225	9·313	17·0	434·8	320·8	114 0	Traces	Seriously contaminated.
83	Rockliffe, Ont	R. H. C. No. 1.	"	23	·22	·18	3·92	7·0	282·8	164·8	158·0	Heavy trace.	Seriously polluted.

REPORT

OF THE

ENTOMOLOGIST AND BOTANIST

(JAMES FLETCHER, LL.D., F.L.S., F.R.S.C.)

1905.

OTTAWA, December 1, 1905.

DR. WILLIAM SAUNDERS, C.M.G.,
Director of Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to hand you herewith a report on some of the most important subjects which have been brought officially under my notice during the past season.

There is a satisfactory and ever increasing evidence of the appreciation of the value of the investigations carried on by the officers of the Division. This is indicated by the large number of letters received from farmers, fruit growers and others in all parts of Canada and by the constant demand for the services of the officers at various meetings.

The work of the Division has been during the past year of the same nature as that of previous years. Investigations have been continued of the life-histories of various insect pests, together with practical tests of the most effective remedies. In the botanical branch, the experiments with fodder plants of all kinds have been carried on as heretofore and have proved of great interest to visitors. The past season in the Ottawa district was particularly propitious for the development of grasses, clovers and other fodder plants. As some of the old plots had gradually become unproductive, it was thought well to plough up one-third of the experimental grass garden and clean it by sowing to rape. This was done early in July, and at four successive dates portions were sown and notes kept upon the crops. Next year another third of the grass garden will be treated in the same way and that part cleaned this year will be again used for grass plots. The following year the remainder will be treated.

Correspondence.—The correspondence of the Division has again during 1905 shown a considerable increase in the number of letters both received and despatched. From December 1, 1904, to November 30, 1905, the number of letters, exclusive of circulars, registered as received was 3,406 and the number despatched 3,291.

Meetings attended.—Meetings of farmers' institutes and agricultural associations of various kinds have been attended whenever other official duties would allow of absence from Ottawa.

December 7 to 9, 1904: Windsor, N.S.—The Fruit Growers' Association of Nova Scotia: 'Insects Injurious to Fruits in Nova Scotia.'

December 12: Amherst, N.S.—Maritime Winter Fair: 'Insects Injurious to Live Stock.'

December 29: Philadelphia.—Association of Economic Entomologists and Society for the Promotion of Agricultural Science, Annual meetings: 'Injurious Insects of 1904 in Canada'; 'A destructive Ptinid new to North America.'

February 3, 1905: Guelph.—Address before the students of the Agricultural College on 'Methods in Nature Study.'

February 4: Toronto.—Address on Nature Study and Natural History before Toronto University (Saturday afternoon Popular Lecture).

May 26: Ottawa.—Union Teachers' Convention: 'The Use of Insects in Nature Study.'

May: Ottawa.—Two addresses before the Normal School; 'Nature Study—Birds.'

June 6: Toronto.—Address before Toronto Horticultural Society on 'Insect Pests and How to Exterminate them.'

June 7: Hamilton, Ont.—Hamilton Horticultural Society: 'The Gardeners' Insect Enemies in June.'

June 8: Guelph.—Ontario Agricultural College: 'What the Experimental Farms are doing for Canada.'

June 8: Guelph.—Macdonald Institute: 'The True Place of Nature Study in Education.'

June 30: Ottawa.—Dominion Seed Growers' Association: 'Co-operation between Seed Grower and Entomologist.'

June 27: Ottawa.—Ottawa Horticultural Society: 'What Plants do.'

July 5 and 10: Ottawa.—Two addresses on Birds before Ottawa Normal School, Summer School of Science.

July 13 and 14: Ottawa.—Two addresses on Insects before Summer School of Science, Ottawa.

August 21 to Sept. 23.—Manitoba, North-west Territories and British Columbia: Holding meetings, making investigations and inspecting Fumigation Stations.

October 18 and 19: Guelph.—Attending Annual Meeting of the Entomological Society of Ontario: 'Injurious Insects of Ontario, 1905'; 'Entomological Record, 1905.' At this meeting a paper was also read by Mr. Arthur Gibson upon 'Injurious Insects of the Flower Garden.'

Mr. Gibson also attended the County of Carleton Annual Exhibition at Richmond on September 26, and judged the Natural History exhibits made by the school children of the county. These exhibits were on the whole satisfactory and showed careful work, particularly on the part of the teachers.

Collections.—The collections of insects and plants in the Division have been largely increased during the past year. Mr. Gibson, who has charge of the insect cabinets, has mounted and placed a large number of specimens. The collection of lepidoptera is now in excellent working order. Efforts will be made to build up the reference collections of the other classes of insects as quickly as possible, as information is being constantly sought for from the Division by the large number of students in all parts of the Dominion who are giving so much attention to Nature Study. Mr. Guignard has also added several hundred sheets of mounted plants to the herbarium and a large number of defective specimens have been replaced by better. Several valuable donations have been received from correspondents, of which the following are worthy of special mention:

Anderson, J. R., Victoria, B.C.—Many specimens of rare British Columbian plants.

Bilodeau, Arthur, Ottawa University.—Botanical specimen of *Hieracium murorum*.

Bush, A. H., Vancouver, B.C.—Some rare and much desired British Columbian lepidoptera.

Cockle, J. W., Kaslo, B.C.—Eggs and larvæ of interesting mountain lepidoptera.

Criddle, Norman, Aweme, Man.—Several rare western plants and moths; also seeds of weeds.

Denny, Edward, Montreal.—A beautiful series of *Apantesis vittata,* and living larvæ.

Dod, F. H. Wolley, Hillarville, Alta.—Eggs of rare western lepidoptera.

Dupret, Rev. Father H., Montreal.—Botanical specimens of the rare orchid *Epipactis viridiflora,* found at Montreal; and of *Sibbaldia procumbens,* from Mount St. Hilaire, Que.

Fraser, George, Ucluelet, B.C.—Several living plants of western ferns and other rare species of British Columbian plants, including *Apargidium boreale,* first found in Canada by Mr. Fraser.

Freeborn, J. J., Dundas, Ont.—Several samples of interesting seeds.

Gellatly, D., Gellatly, B.C.—Seeds of cut-leaved variety of *Sambucus melanocarpa* and *Ribes viscosissimum,* and specimens of the fungi which are stored by the mountain squirrels as food in winter.

Harrington, W. H., Ottawa.—Several specimens of rare Ottawa plants, some of them new to the Ottawa list.

Harvey, R. V., Vancouver, B.C.—Two specimens of *Thecla johnsoni,* a new species recently described from British Columbia; also named specimens of rare flies and other insects.

Keen, Rev. J. H., Metlakatla, B.C.—Specimens of unmounted lepidoptera.

Marmont, L. E., Rounthwaite, Man.—Larvæ of *Apantesis incorrupta* and specimens of several species of moths.

Miller, H. H., Guelph, Ont.—A beautiful collection of mounted specimens of the principal weeds with their seeds, prepared specially for seedsmen and showing all species mentioned in the Seed Control Act, 1905.

Perrin, Jos., MacNab's Island, Halifax, N.S.—A series of local forms of *Salyrus alope* and a pair of *Argynnis aphrodite.*

Stoker, Mrs., Cowichan Lake, B.C.—A collection of seeds of 130 species of British Columbian wild plants.

Venables, E. P., Vernon, B.C.—Noctuid moths from the Okanagan valley.

Willing, T. N., Regina, N.W.T.—Specimens of western moths and botanical specimens from various localities in the North-west Territories.

Young, C. H., Hurdman's Bridge, Ont.—A collection of specimens of beautifully mounted microlepidoptera, all taken at Ottawa.

I have the honour to be, sir,

Your obedient servant,

JAMES FLETCHER,

Entomologist and Botanist.

DIVISION OF ENTOMOLOGY.

CEREALS.

Cereal crops in all parts of the Dominion have been heavy and of excellent quality in 1905. The unprecedented crop of about 85 millions of bushels of wheat in Manitoba and the North-west has bountifully confirmed the sanguine anticipations of those who justly have such confidence in the Great West. Oats, barley and other grains have been equally satisfactory with the staple crop, wheat. There has been an enormous increase over 1904 in the amount of fall wheat harvested in the rich lands of south-western Alberta. Weather conditions, although such as to cause considerable anxiety at times, from cool weather during growth, with frequent rains, proved to be most propitious for the production of high quality grain. The long open autumn allowed the enormous crop to be safely garnered.

There were few adverse influences. Rust, although locally present, had little effect on the main crop. Two weeks of hot weather just before harvest caused the grain to ripen up all at once and rather prematurely; but Mr. Willing writes at the end of the season: 'Weeds were too abundant in many places, but I have heard of no serious damage to grain crops by pests except in the early part of the season, by cutworms in Alberta and parts of Assiniboia.' In Ontario, 'while a majority of correspondents describe fall wheat as of good quality, some speak of the grain as being rather shrunken and light in weight.' 'Very little harm to the crop was reported from Hessian Fly or other insects.' (Ontario Crop Report No. 90, for Nov. 1905). In Quebec, crops were well up to the average. In New Brunswick a protracted summer drought in some parts reduced crops of all kinds, but early sown wheat threshed out a good yield.

In Nova Scotia the Secretary of Agriculture writes: 'On the whole, I think the province may be congratulated upon having received a bountiful harvest. Hay, oats, wheat and potatoes are the most important crops and have reached a high average.' In Prince Edward Island Rev. A. E. Burke reports: 'No rust of any account on grain. Wheat, oats and other grains, a bumper crop. In a very restricted circle Hessian Fly and Joint Worm attacked the wheat.' Prof. Readey writes in the August Crop Report: 'The wheat crop is above the average. In the vicinities of New London, Stanley Bridge and Cavendish, the wheat Joint Worm is reported as doing considerable damage.'

The Hessian Fly (*Cecidomyia destructor,* Say).—There is little mention of injury by the Hessian Fly in Ontario during 1905, although in Prof. James's November Crop Report it is stated that a few complaints were sent to his Department; but in no case was there serious damage. Slight attack was also noticed in Prince Edward Island. A rather more considerable injury to the spring wheat crop occurred in Manitoba. Several correspondents estimate the loss at about 5 per cent. All evidence so far at hand indicates that the Hessian Fly in Manitoba is single-brooded, a fortunate fact in this country, where such a large area is devoted to wheat. In Alberta there has recently been an enormous increase in the acreage devoted to fall wheat; and, fortunately, up to the present time, no trace of the Hessian Fly has been found in that province. It will be well, however, for the fall wheat growers in the country to the south of Calgary to be on the look out for this insect and be prepared to adopt the methods of controlling it which have been so successful in the older provinces. Reports of the presence of Hessian Fly began to come in at the end of August, and through the courtesy of Mr. Geo. Batho, of the *Nor-west Farmer,* Winnipeg, I have been allowed to

consult the correspondence which was sent in to his paper on the subject. The district over which the Hessian Fly injured wheat crops to some extent, was the whole south of the province, west of the Red River, and a short way into the North-west Territories. Mr. Batho, writing on October 9, says:—

'There was some loss due to the Hessian Fly over a large area in the southern part of the province; some fields about Morden, Roland and Carman were badly struck; but the attack was not general in all fields in any other part of the country. From most of our reports it would appear that the heavy crops escaped, but the light ones were always likely to be attacked. It seems to me that this can be explained by the heavy crops occurring on land which had been summer-fallowed, and where consequently no flies had wintered over, while the light crops were on stubble land that had been cropped last year and which might have been affected to some extent, although the injury was not noticed.'

'Nov. 22.—I have found out since I last wrote, that the loss from the Hessian Fly is probably greater than one might suppose from any reports that have been published. A farmer at Griswold told me the other day that there was considerable loss in that district. At Portage la Prairie there was heavy loss, and one farmer stated his belief that there was a small amount of loss every year and had been for several seasons past.'—Geo. Batho.

There is little doubt that loss from the Hessian Fly was larger than was generally recognized; but, owing to the heavy crop of wheat all through the country, little attention was paid to this matter. Unfortunately, many of the farmers of the West take the mistaken view of the subject that is expressed in a letter upon this outbreak, published in the *Nor-west Farmer* of September 5 last, where the writer says: 'I think the estimate of 5 per cent not too high for the loss. Where I am cutting, I expect 35 or 40 bushels per acre, so I do not kick about a little loss.' The writer evidently does not appreciate that the little loss of this year may multiply, under favourable circumstances, into an enormous one next year. The article referred to in the *Nor-west Farmer* was very timely, and stated the facts of the case plainly and well, giving the life history of the insect, the best remedies, and concluding with the following wise statement:—

'The principal reason why care should be taken to destroy the pupæ of the Hessian Fly this fall, is of course to prevent the possibility of a much more serious attack next year.'

The following extracts from correspondence show how widespread the attack was in Manitoba, and the probable loss:—

'Aug. 28, Virden, Man.—Crops are apparently good; but, when the binder goes into the field, they do not show up so well. We are able, by lowering the binder, to pick up most of the grain; but the sample is not as good as the rest of the field.'—A. P. Power.

'Aug. 29, Pilot Mound, Man.—It seems to be all through the crop of wheat this year.'—J. S. Moffatt.

'Sept. 2, Wellwyn, Sask.—The insects are located between the sheath and the straw itself. The damage will amount to from two to three bushels to the acre, as it is impossible to pick up all heads with the binder.'—F. J. Collyer.

'Sept. 7, Reston, Man.—I first noticed the Hessian Fly at Roland. Most farmers showed no interest in the matter, saying that the trouble occurred to the same extent every year. One old Ontario farmer, however, who knew the Hessian Fly, deplored its appearance, remembering the harm that it had done in Ontario. At Miami I found a few flax seeds in a late crop and a few at Belmont and Reston. The field at Roland would average 5 per cent injury all over; but in some patches it would be more than double that.'—John McBean.

'Sept. 7, Portage la Prairie, Man.—I noticed damage from Hessian Fly seemed to be much worse after two days of heavy wind towards the last of cutting. Crops on

some of the older land were injured to the extent of 5 per cent or more These summer-fallows on new land did not seem to be so bad.'—D. W. McKirdy.

'Oct. 31, Cartwright, Man.—We have a little Hessian Fly here, but some miles away further south it was very bad. I put a letter in the local paper, advising farmers to burn straw even more liberally than they have been in the habit of doing.'—E. F. Heath.

'Sept. 7, Wellwyn, Sask.—Hessian Fly has done great harm to the wheat crop here this year.'—John Hislop.

There seems to have been no uniformity of opinion as to the crop conditions which attracted the females when they were laying eggs, some farmers stating that the heavy crops on summer-fallowed land were worst attacked, while others claimed that exactly the opposite was the case. The following letter from Mr. L. E. Marmont, who has made a study of insects and their habits is of interest:—

'Nov. 28, Rounthwaite, Man.—I regret to say that the damage in this neighbourhood from Hessian Fly during the past summer was the worst since 1902. On summer-fallows, where the wheat was heaviest, there were so many broken down straws that it interfered with the proper working of the binder. Cutting had to be done so low down to get the bent over stuff, that it resulted in long ragged sheaves and an amount of straw which made an appreciable difference in the time taken in threshing. I examined straws in many fields and found from three to five flax-seeds at a joint. Many of these, I found, were very light and apparently dead. We had some extremely warm days during harvest, and this may have affected some of them. The wheat itself in injured stems was almost as plump as the unaffected; so, we cut as low as possible so as to get it. I have urged all my neighbours to try and burn their stubble, if possible; but the fall has not been very favourable in this way, still a good deal has been burned over, and, if the spring is dry, more will be done then. Threshing was so slow and the ground was frozen up so early that the area of fall ploughing is the smallest ever known; consequently, little has been done in this way against the fly, and I fear we shall have a repetition of the spring damage to the young wheat, such as we had in the spring of 1903, unless the stubble is burnt over or turned down early. I think that from three to five bushels per acre would be a conservative estimate of the damage round here.'

'Dec. 8.—My son and I think that in Blyth and the surrounding district, the damage to wheat from the Hessian Fly would be about five per cent. The early sown grain would be less and the late a little more.'—G. S. Charleson.

The Location of the Injury.—The larvæ of the Hessian Fly attack the stems of wheat, barley and rye, either in the root shoots of fall-sown grain, in autumn as well as in spring, before the stems are formed or of spring grain in the root shoots or at the second joint above the root. The minute red eggs are laid on the leaves by very small gnats half the size of an ordinary mosquito, during June or soon after the young plants appear above the ground. The appearance of the flies and the hatching of the eggs are, however, very much influenced by weather conditions. Both of these may be accelerated by warm damp weather, or the emergence may be delayed by dry cold weather. After emerging, the mature flies pair at once, lay their eggs, and in a very few days disappear. It is claimed that the Hessian Fly does not travel very far from the field where it develops from the puparia or flax-seeds. This is an important point, indicating the necessity of treating fields which are known to have been infested to a certain extent. As soon as the little maggots hatch from the eggs, they work their way down to the base of the leaf sheaths and attack the young stem at its junction with the leaf. Frequently the stem is prevented from forming and the shoot is destroyed; but a very few days' delay in the time of the laying of the eggs or of the hatching of the larvæ, enables the stem to begin to shoot up; and, when this takes place, they nearly always develop and form an ear. In this latter case, the injury is of course much less than when the shoot is destroyed. The larvæ lie at the base of the leaf and attack the succulent tender straw just above the joint, sucking the sap and gradually forming a

more or less noticeable depression in the soft stem inside which they lie. When only one or two maggots occur on a straw the injury is not very severe and attacked stems when not knocked down by high wind at harvest time may produce fairly heavy grain. Sometimes, however, the maggots suck the sap to such an extent that the stem is killed at the point of injury and the tissues separate, when the stem falls over, displacing the flax-seeds and making them appear as if they had formed inside the stem. This was the case last season in Manitoba and caused uncertainty on the part of some observant farmers as to the identity of the insect which had done the injury. I am obliged to my correspondent, Mr. Sanford Manson, for calling my attention to this matter; for it should certainly be mentioned when describing the nature of the attack of the Hessian Fly. He writes:—

'Nov. 23, Sperling, Man.—I send a few wheat stems that have suffered from insect attack this summer. I have just received a very welcome bulletin (No. 52) which treats of insects; but I cannot find anything which resembles it nearer than the Hessian Fly; only the description of that insect states that it is found on the outside of the stem beneath the sheath of the leaf. You will notice that this pupa is inside the stem. I spoke to a number of farmers about the matter, and they all agreed that the pupa was inside the stem. It did not seem to affect the wheat very much, as the broken down heads were as well filled as the standing ones; but in some fields the loss from breaking down so low was that the binders could not pick it up. This made considerable loss, variously estimated at from two to five bushels per acre. It seems to have been general in this district. About the last of September it was found that the pupa had developed and the grub had eaten its way out. Therefore, it is only the deserted shell, which I am sending you. Both early and late sown wheat suffered.'

The material sent showed that some of the flax-seeds were as stated inside the straw; but in these cases the injured straw was blackened from decay, and shreaded and broken up by the twisting of the straw at the time it bent and fell over. By softening the stems in water and examining them carefully, the cavity in which the larvæ had lain while active could always be traced; and, although this depression was deeply dented into the stem, it was actually on the outside of it, beneath the base of the leaf sheath. Mr. Manson and some other correspondents have referred to empty flax-seeds being found on the stems in autumn. This is an important matter as it indicates the probability that parasites or other natural enemies have been at work, and it is therefore a very hopeful sign for the future.

There are several parasites which prey upon the Hessian Fly, and their good offices in the past have been the chief cause of the sudden disappearance from infested districts of this serious enemy of the farmer. When emerging naturally, the pupa of the Hessian Fly works its way out of the brown flax-seed-like puparium and the gauzy, empty, pupa-case is left, protruding conspicuously from the end. A parasite on leaving the puparium gnaws a ragged hole which may be in any part of the puparium. In Manitoba there is only one brood of the Hessian Fly. The puparia are found in the late summer. By harvest time all the larvæ have turned to the flax-seed stage, and the flies do not emerge until the following June. A knowledge of the habits of the insect in Manitoba suggests the best remedial measures. The puparia of all the maggots which attack the root shoots in early summer, and most of those on the straw are left in the stubble fields after the wheat is cut. An effective way of disposing of these is, when it is conveniently possible, to burn over the stubbles before the following year and to plough down the land deeply before the next crop is sown. The burning will destroy a great many of the insects, and the ploughing will put them so deep down that the delicate flies, when they emerge, cannot reach the surface. In years of bad infestation a great effort should be made to get as much fall ploughing done as possible, so as to reduce the danger of infested stubble fields being left for summer-fallowing, owing to the pressure of spring work. As it is necessary to cut low to pick up fallen grain, many of the flax-seeds will be carried with the straw. At threshing

time most of these will fall with the rubbish beneath the machine, or will be left in the straw. All dust and screenings, therefore, should be destroyed, and all straw and small seeds should either be used up during the winter or burnt before spring. In Ontario and the eastern provinces there are two annual broods of the Hessian Fly. The flies of the first brood appear in June and lay their eggs on spring and fall wheat and on rye and barley. Of the second brood the flies appear in September and lay their eggs on fall wheat and fall rye. Wheat, barley and rye are the only known food plants of the Hessian Fly in America, and neither oats nor the grasses are attacked.

The remedies which have given the best results against the autumn brood are late sowing and careful preparation of the land, so as to induce a vigorous growth.

The Western Wheat-stem Sawfly (*Cephus occidentalis,* Riley & Marlatt).—For several years the larva of a wheat-stem sawfly has done some injury to growing wheat at different places in Manitoba and the North-west Territories. It was at first supposed, from the similarity of the attack and from a few reared specimens, that the insect was the European species, *Cephus pygmæus,* L., which had appeared suddenly in injurious numbers at Ithaca, N.Y., in 1889. This attack was treated of at length by Prof. Comstock in Cornell Agricultural College Bulletin No. 11, 1889. The following year the insect disappeared entirely, and nothing has been seen of its work from that time. In previous reports I have referred to this western sawfly as *C. pygmæus,* but recently specimens of our North-western insect have been submitted to Prof. A. D. MacGillivray, of Cornell University, who has identified them as *Cephus occidentalis,* Riley and Marlatt. The insect has been studied by Mr. Norman Criddle, of Aweme, Man., and he has added very materially to our knowledge of the species and its work. He has discovered its native food plants and also that these are far more attractive to it than the wheat plant, which it occasionally infests.

'July 10, Aweme, Man.—I collected several specimens of the Cephus yesterday. They were all resting on *Agropyrum caninum.* So far, I have been unable to find them elsewhere; and, though they are always found rather plentifully around the edges of wheat or indeed anywhere, infesting the above grass, I have very seldom been able to find wheat plants attacked by them. I have not yet been able to get hold of the species which breeds in *Ammophila longifolia;* but I am confident that it will prove to be a distinct species, as the larva is very different, being quite yellow in colour, while that of the Agropyrum species, *C. occidentalis,* is white.'

'July 30.—I found to-day two stalks of wheat infested by Cephus and several stems of *Agropyrum* were found also attacked within a few feet of them. I afterwards hunted over a large area of wheat, but was unable to find another wheat plant which was infested, though any amount of *Agropyrum caninum* was found which had been attacked. In several cases the grass was in the wheat fields. I think, therefore, that the wheat being attacked must be considered an accidental occurrence. At the same time, if the grass failed for any reason to form heads, these insects might possibly develop into a pest of some magnitude.'

'Aug. 4.—Two more stalks of wheat have been found attacked by the Agropyrum Cephus in a place where that plant was rare. I also found it quite numerously yesterday infesting our native quack grass, *Agropyrum glaucum,* R. & S., var. *occidentale,* V. & S.'

'Aug. 6.—Cephus occidentalis has now been found here, feeding in the following grasses: *Agropyrum caninum, A. glaucum,* var. *occidentale,* and *A. tenerum,* and also in rye and wheat, the first named and possibly the second being the native food plants, the others being only occasionally attacked.'—Norman Criddle.

From the above it is evident that several native grasses are more attractive to the Western Wheat-stem Sawfly than is wheat. Some of the above species of grasses are common in almost all parts of the West, and their occurrence may be hoped to protect wheat from serious attack under ordinary circumstances. Should the larvæ, however,

at any time occur in noticeable numbers in a growing crop of wheat, it may be remembered that they pass the winter on the fields in the bases of straws, which they have cut off before spinning the silken cocoons in which they winter over, close to the surface of the ground. The stubbles in fields which have been infested, should, therefore, be burnt over in autumn or spring, or should be ploughed down deeply before the middle of June, so as to make it impossible for the flies to work their way up to the surface. Stubble fields left for summer-fallowing should be turned down early in June; and, should the insect at any time become more destructive than it has in the past, early summer-fallowing should be practised every other year.

THE JOINT WORM (*Isosoma tritici,* Fitch).—Injuries to grain crops in Canada by Joint Worms are seldom complained of; but during the past summer there have been a few outbreaks which have been serious, although restricted as to area. These were in western Ontario and in Prince Edward Island. Mr. T. D. Jarvis, of the Agricultural College, at Guelph, reports that the Joint Worm was abundant and destructive at Guelph. Mr. D. C. Dewhurst also reported it from Cottam in Essex county, and Mr. R. J. Doake from Millbrook, Durham county. Notwithstanding these local occurrences there were few references to Joint Worms in correspondence. In Prince Edward Island the loss from Joint Worms seems to have been more severe. Through the kindness of the Rev. Father Burke I learnt of the occurrence and obtained particulars. The Joint Worm was frequently found in the same fields with the Hessian Fly and the Wheat Midge. The two last, however, were in much smaller numbers than the first.

'Aug. 22, Bayview, P.E.I.—Find inclosed sections of wheat straw with diseased joints. There is considerable damage to wheat in this locality. The disease is always in the top joint. If this increases here, I fear very much for our wheat crop another year.'—WALTER SIMPSON.

'Sep. 17, Darnley, P.E.I.—Herewith I send samples of injured wheat straw. What is the cause of the swollen and bent stem? Many fields are affected with these distorted joints and short straw. Some fields are half gone.'—WILLIAM BASSETT.

'Aug. 22, Park Corners, P.E.I.—I send sample of my wheat. The whole crop was destroyed by some kind of vermin which has also destroyed all wheat about here.'—ALEX. CAMPBELL.

'Nov. 17, Kensington, P.E.I.—I learn by inquiry that the Joint Worm has been troublesome in lots 18 and 19 in Prince county, and on lot 20 in Queen's. There are also a few other places. Where the crop was light, the damage was almost complete. In strong growing grain there was only slight loss.'—JOHN ANDERSON.

'Aug. 14, Malpeque, P.E.I.—I send you samples of wheat which have been affected while growing, by two different enemies. You will notice that some stalks have a swollen joint just below the head, which has turned it at about a right angle to the stalk. I have opened some of these and find small maggots. Another trouble seems to be that the stalk is eaten almost off very near to the base, so that it dies. These two troubles are causing great damage in this vicinity. Some of our wheat fields in this vicinity, especially in Long River and French River, are much injured, so that some farmers are cutting down their grain for feed.'—REV. E. J. RATTEE.

Upon examining these samples, it was found that they were badly attacked by the Joint Worm and also by the Hessian Fly. There were also a few specimens of the red larvæ of the Wheat Midge clustered round the kernels of the wheat in the ear.

Mr. Rattee was informed what the insects were, and it was suggested that the stubble should be ploughed down deeply directly the crop was cut. In his reply, he points out that there would be difficulty in getting farmers to do this because of the prevailing practice of seeding down with a wheat crop, for hay the following year. This, of course, would be a difficulty everywhere; but, as the Joint Worm distorts the stems so that a large number of the hardened joints occur so close to the ground that they are left on the fields with the stubble, it will be found a paying practice even to plough down these new meadows after a single year's growth, rather than to leave them

for hay while there is any risk of allowing the Joint Worm to increase. Moreover, if a few pounds of clover seed are mixed with the grass seed at the time of sowing, the growth of clover will much more than pay for the seed used by the extra fertility thus added to the soil. Mr. Rattee states that the areas specially infested in his district were the western portion of Queen's county and the eastern part of Prince county.

The standard remedies for Joint Worms are deep ploughing or the burning over of stubble before the insects emerge in spring, the destruction of straw and screenings, and a short rotation of crops, with high farming to keep up the fertility of the soil. Prof. F. M. Webster, who has made a special study of the insect enemies of small grains, writes on this subject in Circular No. 66, U. S. Bureau of Entomology, as follows: 'There are no known remedies for Joint Worms; but there are several preventive measures that are not impracticable and are reasonably efficient. The Joint Worm Convention which was held many years ago at Warrenton in Virginia, recommended officially that a better system of farming be adopted, with the use of guano and other fertilizers, to promote a rapid growth and early ripening of the grain, and also the burning of stubble, all of which are as advisable to-day as they were at that time. The most serious ravages are observed on thin or impoverished soils, especially along the margins of the fields infested. Anything, then, that tends to add vigour to the young growing grain, will constitute a preventive measure. Burning the stubble where this is practicable, is, of course, most efficacious; but, over the larger portion of the territory ravaged by this pest, it is customary to seed for grass after wheat, and under this condition burning over the stubble fields is impossible. Such fields should be raked over with an ordinary hay rake and the loosened stubble removed and burned before the adults emerge in spring.'

If the straw can be cut low enough to carry the larva-bearing joints from the field with the crop, the using up of this straw before spring would dispose of the insects in a satisfactory manner. It must not be forgotten that at threshing time many of the broken off hardened pieces of straw become separated and are carried through with the grain or with the rubbish. These, therefore, must be attended to in some way which will destroy the larvæ or prevent them from hatching in the spring. All screenings are far better for feed when crushed, and the larvæ in the refuse might be destroyed by placing this in a cattle yard, where it would be trodden into the sodden earth, or into a fresh manure pile, where the insects would be destroyed by the heat of fermentation or by being saturated with the ammoniacal liquids.

The Wheat Midge (*Diplosis tritici,* Kirby).—In my last year's report I referred to an outbreak of this old enemy of the wheat grower, in the Chilliwack valley of British Columbia. As it was thought possible that the injury might recur this year, a full account of the life history was then given, with a list of the best remedies. During the past summer the Wheat Midge again appeared and was the cause of much loss. Mr. Thomas A. Sharpe, the Superintendent of the Experimental Farm for British Columbia, reports as follows:—

'Agassiz, July 19.—Our spring wheat is badly infested with weevil (= Wheat Midge). Last year it took a large share of Chilliwack spring wheat and some late patches on this side. This year it is taking every one's crop so far as I can hear.'

In 1904 the British Columbia outbreak was the only one reported; but during the season of 1905 I have received reports that the Wheat Midge has been detected at one or two localities in Ontario and in Prince Edward Island. Undoubted specimens were received from the Rev. E. J. Rattee, of Malpeque, P.E.I., and Dr. Charles E. Saunders handed me a specimen found at Ottawa in wheat grown on the Experimental Farm. He further tells me that he found a few of the larvæ last year, when examining hybrid wheats produced in the experimental plots. He also gave me grains of wheat showing the characteristic injury of this insect. In the Ontario Crop Report for August last it is stated that, although all correspondents are silent as to the presence of Hessian Fly, three or four mention injury from either Midge or Joint Worm.

As this minute insect is capable of causing enormous losses in the wheat crop, should it increase in numbers, it seems well to repeat the remedies which have given the best results.

Remedies.—The remedies for the Wheat Midge depend largely upon the way it passes the winter. The methods which have given the best results are as follows:—

(1) Deep ploughing directly the crop is carried, so as to bury the larvæ so deep that the flies cannot work their way out through the soil.

(2) The burning of all chaff, dust or rubbish known as 'screenings' or 'tailings' from beneath the threshing machines, as these contain many of the larvæ which are carried with the crop. If fed to chickens or domestic animals, this should be done in a place where none of the puparia can escape destruction.

(3) Clean farming, including the cutting of all grasses along the edges of fields and the ploughing down of all volunteer crops found in wheat fields before winter sets in, so as to destroy an autumn brood where one exists.

(4) The cultivation of such varieties of wheat as experience has shown are least affected by this insect.

CUTWORMS IN GRAIN.—There have been rather extensive injuries by cutworms in grain fields in some parts of Manitoba and the North-west Territories during 1905. The worst of these were in the Edmonton district and other points in Northern Alberta, and in Northern Manitoba. Very few specimens were sent with these complaints of injury, farmers for the most part failing to see the importance of forwarding samples of what they consider such a well known pest. This, however, is far from being the case, and it would help most materially in many instances toward getting prompt and useful advice if specimens were sent. There are a great many kinds of cutworms, all of which vary somewhat in their habits. The points of value to a specialist when advising farmers how to avoid loss, are the exact identity of the species at work, because the habits, the ordinary food plant, usual time of attaining full growth, when power to do injury to crop ceases, and many other points which bear on the choice of the most practical remedy to be recommended, are already known for many species of cutworms. A glance at specimens of the insects is of far more use than the longest descriptions of the cutworms by those who are not used to describing insects. From such specimens as were sent, it is evident that the greater part of the loss in many different kinds of crops was due to the Red-backed Cutworm (*Paragrotis ochrogaster,* Gn.). This is a very wide-spread species, occurring from Nova Scotia to British Columbia. The caterpillar, when full grown, is nearly two inches long; it is very voracious, and will attack almost all succulent vegetation. It is the species which has been the cause of by far the greater part of the loss in grain fields of the West during recent years.

The following letters, chosen from many received, indicate the nature of the infestation:—

'June 10, Regina.—Cutworms, mostly *P. ochrogaster,* are making havoc in wheat and oat crops up the Edmonton line.'—T. N. WILLING.

'June 12, Edmonton.—I send specimens of worms that have been destroying the grain about a month. They seem to be most destructive on summer-fallow, although they are now working on spring ploughing and new breaking. They have completely destroyed about ten acres of oats and barley for me, and partly destroyed some wheat. They have destroyed grain over a large part of this country, some having lost from one-third to one-half of their crop. They are now crawling over the ground by the thousand and are working on grain that is ten inches high.'—JOHN N. KERR.

'June 12, Winnipeg, Man.—I have just returned from a week's farmers' insitute work in the Swan River and Dauphin districts in Northern Manitoba. At Dauphin a number of the farmers were complaining that considerable damage had been done

to the crops by cutworms. One farmer, Alex. Birrs, of Dauphin, had had about ten acres of his oat field entirely cleaned out by this pest.'—GEO. BATHO.

'June 20, Dauphin, Man.—I have sent by this mail a pill-box containing about ten cutworms gathered from my barley field, together with a few of the stems cut off by them, including a sunflower stem, which was not cut through entirely, but so nearly so that the plant had fallen to the ground. When I last wrote, the cutworms were working in my neighbour's wheat; but on Friday last they appeared in my barley, although half a mile intervenes, which is sown to wheat. These pests are very prevalent in the Dauphin district. I had an idea that their spreading arose from allowing fallows to grow up in weeds. Their appearance in my barley confirms this idea, as my barley field was not ploughed until spring. A part which was fall-ploughed is free of cutworms. I will be glad of your opinion of this matter.'—THOMAS C. ROBSON.

'November 21, Winnipeg, Man.—Cutworms have been noticeable in some districts during the past season. Reports in a few cases indicated that crops of oats and wheat had to be ploughed up; but the extent of the damage from this pest could not be considered in general to be alarming. It is sufficient, however, to show that in future this insect will have to be considered by the agriculturists of Manitoba, and perhaps, in some districts, a system of cultivation, adopted that will tend to retard its reproduction.'—W. J. BLACK.

The poisoned bran remedy for cutworms is so remarkably effective that I cannot understand how it is farmers who suffer year after year from these enemies, do not remember about it and save their crops. On the whole, I know of no remedy for any injurious insect which has given better results. I can only suppose that the reason why it is not more used, is that, owing to the large size of grain fields, added to the fact that the cutworms do their injury at night, farmers do not at first notice them and then give up in despair, thinking that nothing can be done. A noticeable feature in nearly all the letters received was that these outbreaks occurred on land where vegetation had been left standing the autumn before, either in stubble fields or upon so-called summer-fallows which had been allowed to grow up to weeds late in autumn, because it was thought that, as the weeds could not ripen seeds after the last harrowing, they could do no harm. The presence of vegetation on land in autumn, however, attracts the female moths which lay the eggs from which cutworms are produced. Therefore, all summer-fallows should be kept thoroughly clean right up to cold weather in autumn. Another noticeable fact with regard to the habits of the Red-backed Cutworm is its tendency, when occurring in large numbers, to take the habit of the true Army Worm and march from field to field in search of food. This enables farmers who are alert to head off their advance by placing poisoned bait in their way, which they will eat as soon as they reach it and will be killed in large numbers. If bran cannot be conveniently obtained, any kind of coarse vegetation may be used,—lamb's-quarters, grass, or weeds tied in loose bundles—taking as much as can be grasped in the hand at one time for each bundle, and then dipping these into water containing about an ounce of Paris green to 5 gallons of water. These bundles should be placed about six or eight feet apart, in advance of the army of caterpillars. If bran can be obtained, the mixture should be made dry enough to be broadcasted lightly through the grain or in such places where the cutworms are most abundant. The food habits of the Red-backed Cutworm are remarkable and differ in this respect from almost any other insect known to me. Sometimes a horde of these caterpillars will attack by preference some particular kind of plant and leave other things untouched. They have been found to occur in weedy wheat fields and confine their attention entirely to the lamb's-quarters and other weeds. In other places they will attack oats and leave everything else untouched, and, even when an oat field joins a wheat field, they will stop when they reach the wheat and wander on long distances in search of other food. At other places it will be the wheat that is destroyed and oats will escape. From the above, it is plain that some little observation and thought will be of advantage when an attack is noticed. and it may even

be found wise on special occasions to leave a horde of cutworms alone all the time they are confining themselves to weeds, but to watch them carefully and have everything ready to apply the poisoned baits, should they change their taste and turn to the farmer's crops. What I wish to point out to farmers now, is that in outbreaks of cutworms, both in gardens and also in field crops, the poisoned bran is a practical remedy which they will do well to try, over a small space, at any rate, whether they believe in its efficacy or not. I have occasionally met people at farmers' institute meetings who jeered at this remedy and declared that it was of no use. In every instance, however, I have found, upon pressing the matter, that it had never been tried by those who condemned it. In field practice, then, it is plain we have two good remedies for cutworms, first the keeping down of all weeds in the autumn, so that the egg laying female moths may not be attracted to the fields, and the poisoned bran or poisoned bait in spring, when the cutworms are found at work.

Grasshoppers or Locusts.—The same satisfactory report which was made last year with regard to the injurious occurrence of locusts in Manitoba can be repeated for 1905. The only injuries by these insects which were brought to my notice in 1905, were in Manitoba, and were of a trifling nature. This was probably largely due to the nature of the season in those districts, where in the past they have done so much harm. Mr. W. J. Black, the Deputy Minister of Agriculture for Manitoba, writing on this subject, says: 'That celebrated Manitoba intruder, the grasshopper, was not in evidence during the past year to the same extent as previously. A few farmers in the municipality of South Cypress found it necessary to use Paris green to destroy the insects during the early summer; but, owing no doubt to an abundant rainfall in the season when crops were growing, no serious damage has resulted.

Mr. Norman Criddle, of Aweme, Man., says:—'Locusts are no longer troublesome here. In the Stockton district a strip of wheat on light soil was noticed which had been eaten into for about fifteen feet. This was the only place that I have heard of where any damage was done, and, so far as I could see, no effort had been made to stop their depredations.

The Pea Moth (*Semasia nigricana,* Steph.).—The caterpillars of the Pea Moth were abundant in Nova Scotia and New Brunswick, and also in some parts of Quebec province and in northern Ontario. In the past there is no doubt that injury by this insect has been confused with that of the Pea Weevil. This is largely due to the foolish and widespread use of the word 'bug,' for every kind of insect; but in this case I find that it has been the cause of the useless expense and trouble in treating a large number of seed peas for an insect which was nowhere near the seed but was passing the winter safely in the fields where it had destroyed a crop the previous year. The Pea Moth has come much more into prominence during the past two seasons, owing to the almost total absence from our Canadian pea fields of the Pea Weevil (*Bruchus pisorum,* L.). The presence of the Pea Moth in Canada as an enemy of cultivated crops may be said to be a regular occurrence in all the eastern provinces, from the Atlantic seaboard as far as the eastern counties of Ontario. In the province of Ontario, although sometimes widespread and serious outbreaks occur, they are of a very intermittent nature and for many years no injury can be detected in cultivated peas. There is, however, in wild leguminous plants a native insect with a very similar caterpillar, which is widely distributed through most parts of Canada. Although the work of this insect has been detected many times, up to the present the moths have not been reared.

Owing to the importance of the injury by the Pea Moth, I have, when occasion arose, tried experiments to see whether spraying the peas immediately after the pods were formed with a poisoned soap mixture might not be effective in the same way that a similar treatment is for the Codling Moth. The insect occurs so seldom at Ottawa that it is difficult to arrange experiments. Some years ago Mr. J. E. Wetmore,

of Clifton, N.B., kindly carried out for me some experiments which seemed to indicate that this might be a useful remedy; but I regret to say that some careful investigations recently made by Mr. Saxby Blair, at the Experimental Farm at Nappan, Nova Scotia, have not confirmed these good results. The exact history of our American Pea Moth has never yet been traced; but it is to be presumed that the eggs are laid on the young pods as soon as these are formed, and that the caterpillars eat their way into them and attack the forming seeds. It was hoped that, by distributing a thin film of poison over the plants and pods, the young caterpillars would be poisoned when eating their way in. On account of the waxy covering on the surface of all parts of the pea plant, whale-oil soap was added to the poison mixture to make it adhere. For early peas the application was Paris green ¼ lb., whale-oil soap 1 lb., water 40 gallons. The plots were sprayed just after the pods were formed, and one application only was made. The early varieties of peas used were the Alaska, Gradus and American Wonder. The pods were gathered about 10 days after the spraying, and, when the treated and untreated lots of 500 pods each were examined, it was found that there was practically no difference in the amount of infestation, which ranged from 3 to 11 per cent. For late peas, the amount of Paris green was doubled for a second application, that is, these peas received two sprayings, the first on July 20, with the ¼ lb. mixture of Paris green, and the second on July 29, with half a pound. The pods were not gathered until August 17, and the results were no better than in the other experiments. Where the poison was used, 22 per cent of the pods were wormy; and where none was used, there were a few more, i.e., 27 per cent. It is possible that a knowledge of the full life history of this insect may give a suggestion as to a practical remedy, and efforts will be made to obtain these data as soon as possible.

The remedies which have given the best results, are the planting of peas as early as possible and sowing the earliest ripening varieties. For table use any variety which can be grown ready for the table by the first week in July, will be free from attack. As this insect passes the winter as a caterpillar inside a silken cocoon spun in the ground beneath the plant upon the seeds of which it had fed, it is of course advisable to adopt the common sense practise to use land for the new crop as far as possible removed from fields which have been used previously for the cultivation of seed pease. As soon as the crop is picked, all pea vines should at once be burnt so as to destroy small and imperfect pods which frequently contain the larvæ of the moth.

The perfect insect which lays the eggs from which the 'pea worms' hatch is a small gray moth three-eighths of an inch in length when the wings are closed, which is able to fly a considerable distance. A correspondent was good enough to give me the following information which may be of use in working out the complete life history of this insect. Mr. W. E. Taylor, writing from Beaverton, Ont., on Nov. 25, says:

'I wish to ask you about the statement in Bulletin 52, where you recommend to sow pease as far as possible from the previous year's pea field. I sowed my pease this year more than a mile from any other pea field and pease have not been grown near here for three years. The crop was wormy. We have no 'Bug' or true Pea Weevil here, so they were the caterpillars of the Pea moth. The seed was sown about May 20, and it was an early kind, the June or Dan O'Rourke. How did the pest get here? Do the moths lay eggs on the dry pease and gum them over?'

In the above instance the moths must have flown from a distance to lay their eggs. These, as stated above, are laid outside the pea pods, while these latter are green and soft.

FODDER CROPS.

Fodder crops were, on the whole, very satisfactory. Large crops of hay were secured in the west, and the prairies provided good pasture all through the summer. Brome grass and Western Rye grass are being more grown every year. 'Pastures (in

Ontario) were in from fair to good condition during the summer and fall, and this favoured all classes of live stock. Cold, wet weather at time of planting gave corn a set back; but midsummer conditions were so favourable that corn picked up in a wonderful way. Most returns show an average yield.'—C. C. JAMES, *Nov. Crop Bull.*

The same conditions and results as prevailed in Ontario, were also found in Quebec and parts of New Brunswick. For the last named province, generally speaking, the crop of hay was good; some counties cut more than ever before, but a cold, wet spring followed by a long drought was severely felt in some places. The returns from Nova Scotia in all but two or three counties show fodder crops were well above the average. 'We have had a better season for the growth of crops than for several years, that is, if we except apples.' (B. W. Chipman.) In Prince Edward Island 'Hay crops were almost up to the average. Clover and timothy were somewhat light owing to the drought of last year. Hay was saved in good condition. In very few places is corn reported below the average.' (J. C. Readey.) There was no serious loss in fodder crops from insects. Cutworms, as is the case every year, were troublesome in some places early in the season, but the season allowed of gaps being filled by resowing. Near Montreal the Corn Root Maggot was reported in corn fields where germination of the seed had been delayed by cool, dry weather. Clover, although very much attacked by the Clover-seed Midge in Ontario, gave very heavy crops of hay in all the eastern provinces of the Dominion. The Clover Leaf Weevil and the Green Clover Weevil were reported from the Ottawa district, the former for the first time, and the Red-headed Flea-beetle (*Systena frontalis,* Fab.) from Ottawa and Guelph; but no appreciable injury was wrought. Clover Dodder was frequently inquired about from the abundance of the seed in clover seed sold. In one instance a crop of alfalfa at St. Mary's, Ont., was much injured.

THE ROSE CHAFER (*Macrodactylus subspinosus,* Fab.).—This well known enemy of the fruit grower and flower gardener has this year appeared in a new role. Towards the end of June last the Steele, Briggs Seed Co., of Toronto, sent me several specimens of the Rose Chafer beetles, with the surprising statment that they had been taken from a 20-acre field of fodder corn, growing near Priceville, Ont., which they had been attacking for two days. The corn at the time was about eight inches high, and growing very thriftily. There was no appearance whatever of any trouble four days before the letter was written; but the beetles appeared in vast numbers on June 26, and covered about two-thirds of the field, averaging about twenty insects to a plant, and began to devour the leaves. Naturally a remedy was asked for as soon as possible, as it was claimed that no one there knew the insect or had ever seen anything like it before on corn. It was suggested to the owners, Messrs. S. Price & Sons, of Toronto, to spray the fields at once with a whale-oil soap solution of one pound of soap in five gallons of water, this application having been found very effective against the Rose Chafer by Prof. Webster, in Indiana, the spray killing every beetle it fell upon. It was also suggested to dust the crop with a mixture of one pound of Paris green in 20 pounds of freshly slaked lime. Fortunately, the visitation was of very short duration, and the crop subsequently outgrew all traces of the injury. Messrs. Price & Sons wrote with regard to this outbreak on July 19, as follows: 'We are glad to say that the Rose Chafers which were injuring our corn field a few weeks ago, have all gone. They all went inside of 24 hours after we had written to you. They stayed with us for three days and did considerable injury; but the corn now seems to have outgrown it, and to be all right. They all flew away before we had a chance to spray them.'

ROOTS AND VEGETABLES.

Root crops in most parts of the Dominion gave heavy returns. Potatoes in Ontario and in parts of Manitoba were materially reduced by the Potato Rot. Turnips were,

generally speaking, poor and far less satisfactory than mangels. The Turnip Aphis was reported as in greater numbers in western Ontario than for many years. In the eastern counties of the province the reverse of this was the case. Cutworms did some harm and the Turnip Flea-beetle was stated to be very destructive in Pictou county, N.S. The Colorado Potato Beetle was less destructive than usual in the Maritime Provinces, but was mentioned as unusually abundant in Manitoba. Mr. W. J. Black, of Winnipeg, writes:—'The Potato Beetle has this year been much more in evidence than ever before; and, in many cases, those who have not been previously familiar with this insect and its method of destroying the potato plant, have had their crops literally consumed before they were aware of what was taking place. The greatest damage from this pest has been in the Red River valley; but it would appear that it is gradually working its way westward. It was noticeable as far west as Portage la Prairie; but at Brandon it has not yet become destructive. Cutworms, chiefly the Red-backed Cutworm, did much injury at several places, in gardens as well as in fields. Where attended to promptly with the poisoned bran remedy satisfactory results were invariably secured. Two new pests of cultivated plants were reported from Manitoba by Mr. Norman Criddle. The Knot-weed Beetle (*Gastroidea polygoni,* L.) did considerable harm to rhubarb by eating holes in the leaves, and *Galeruca externa,* Say, a chrysomelid which feeds naturally on *Lepidium apetalum,* an indigenous member of the cress family, turned its attention to cabbages and turnips.

The Stalk Borer (*Papaipema nitela,* Gn.).—In the past all references to injury by stalk borers in potatoes, corn and other crops in Canada have been for the most part attributed to the caterpillars of the Stalk Borer (*Papaipema nitela,* Gn.), sometimes referred to as the Potato Stalk Borer. At Ottawa many years ago I found that nearly all injuries by stalk borers to plants in vegetable and flower gardens were by the Burdock Borer (*Papaipema cataphracta,* Grt), and I could find no specimens of *P. nitela* in collections, which had been reared from cultivated plants in Canada. During the past summer, however, *P. nitela* was very abundant and destructive in the western counties of Ontario and in the State of Michigan. Through the kindness of Professor Lochhead, I learnt of localities where I could obtain specimens for study. Mr. G. W. Riseborough, of Fargo, Ont., helped me very much in this investigation and kindly sent me several consignments of the caterpillars and the plants they were attacking, as well as some parasites which he had found with the larvæ. Although, on the whole, this abundant occurrence of the Stalk Borer in Ontario had little effect on the crops attacked, it was very interesting and worthy of record.

'Fargo, Ont., July 3.—I was examining to-day some of my corn fields and find that the borer has left them very thin in some places. The injury is more noticeable in corn than in other plants, because the top fades quickly. I have found several other fields besides my own affected by this insect. The good corn weather which we have had recently, has pushed the plants on so fast that the effects of the borer are not nearly so apparent now as they were, and, apart from one or two pieces, the damage does not seem to be very great. Many other plants were affected in this neighbourhood besides the corn. I have found the caterpillars in potatoes, tomatoes, Canada Thistle, elder, lamb's-quarters, garden beans, ragweed and a few kinds of garden flowers.'

'July 7.—I was looking at 30 large tomato plants to-day which are just beginning to blossom, and I find 8 of them with borers in them.'

'July 13.—I found a worm yesterday just beginning to bore into a pigweed stem. When discovered, only his head was buried. In fifteen minutes he had buried in his whole length. I was surprised, too, to find a plant of sweet clover which as you know has a very tough stem, with three holes in it and two worms. They cleaned out the centre of the stem for about two feet. The early potatoes, tomatoes and most flowers and weeds do not show the effect of the borers so quickly as the corn does, because they do not fade so easily. The corn in this section never grew more quickly than during

the last two weeks. The effects of the worm are not so noticeable as they were a little while ago.'—G. W. RISEBOROUGH.

'Mount Brydges, Ont., June 30.—I send you specimens of a grub which is playing havoc with the potato and the tomato crop. They bore into the stalk and eat the heart out. I have taken dozens of them out of potato and tomato plants and of course the plant is done when the trouble is noticed.'—W. B. DUNN.

It is very seldom that a remedy is required for stalk borers in Canada. The number of specimens which occur in any one locality is, as a rule, small, and no remedies need to be applied. Whenever an injured plant is noticed, the borer should be sought for and destroyed; but I know of no treatment by which their outbreaks could be prevented. The presence of the larvæ in many kinds of weeds points to the advantage of keeping down all such useless and unnecessary vegetation.

THE CORN WORM (*Heliothis obscura,* Fab., =*H. armiger,* Hbn.).—This insect which always occurs in Canada in an irregular manner did no harm in the eastern provinces and in Ontario, but for the first time was complained of from Manitoba. The species was known to occur in the prairie provinces from moths which had been collected, but up to the present so little sweet corn has been grown for table use that no one had noticed its injury before this year. The first mention came to me through the *Nor-west Farmer,* early in September. The samples sent were grown by Mr. Neil Bayne, at Pipestone, Man., who sent several ears injured in the ordinary way, and also some of the caterpillars at work in them. Both the green and the brown colour varieties were represented. The brown were stated to have been much more abundant in the early ears of corn, to which they had done a great deal of damage. The attack came to an end about September 20.

Under date September 11, Mr. W. C. Hall, wrote from Headingly, Man.:—'I send an ear of sweet corn (Cory) and shall be obliged if you can let me know what grub this is, which is infesting a great part of the corn this year for the first time. Many ears are destroyed, the injury begins at the top.'

The most westerly occurrence was at Fairy Hill, Sask., from which place Mr. Robert Mollard writes: 'Sept. 4.—Inclosed you will find a cob of corn eaten by a grub, which is also in its place in the cob. This is the first year I ever saw corn affected in this way, and most of the cobs are similarly affected.'

It is only recently that the farmers on our prairies have discovered that they can grow excellent sweet corn for table use, and it will be most unfortunate if this troublesome pest should develop in such numbers as to induce growers to give up the culture of such a popular and wholesome vegetable.

The remedies which have been recommended, are the hand-picking and destruction of the caterpillars as soon as their presence is detected by the premature discoloration of the silk. It is also claimed that many moths may be taken at night in lantern traps consisting of a lighted lantern placed in an open pan containing water with a little coal oil on the top of it. When a crop is known to have been attacked by the Corn Worm, the old stems should be removed from the field as soon as the crop is gathered, and the land ploughed deeply in autumn so as to break up the cocoons and expose the pupæ to the weather and their various enemies among the small birds and mammals.

THE VARIEGATED CUTWORM (*Peridroma saucia,* Hbn.).—In 1900 this large and late occurring species of cutworm did a great deal of harm to all kinds of vegetation on the Pacific coast, extending from Northern British Columbia as far south as Oregon. Very little injury has been recorded against it since that time; but during the past summer the caterpillars were found in noticeable numbers at several places in British Columbia, reports having been received from Mr. J. W. Cockle, of Kaslo, Mr. W. A. Dashwood-Jones, of New Westminster, Mr. R. V. Harvey, of Vancouver, and from Mr. J. R. Anderson, the Deputy Minister of Agriculture of British Columbia, who writes under date July 26:—'I regret to say that *Peridroma saucia* is again bad this year,

not as numerous as in 1900, nor, as far as I can make out, so widely distributed. It is sufficiently bad, however, to induce me to send out the emergency bulletin, of which I send you a copy. It is remarkable how soon people forget what has been told them, and I have constant applications for information as to the best remedy. I am again recommending the Paris green and bran which did such excellent work in the last outbreak.'

Mr. T. N. Willing, of Regina, N.W.T., in reporting on the injurious insects of the year, states that the larvæ of this moth were very abundant during August at Regina, and he sent several of the moths, which he had reared from caterpillars in gardens at Regina.

The comparative abundance of the species in British Columbia should be turned to advantage by gardeners in that province to prepare themselves before next season with materials for poisoning the caterpillars, should they appear again in numbers next summer. If this is done there should be no great loss.

The Turnip and Cabbage Aphis (*Aphis brassicæ,* L.).—Reports relating to the Turnip Aphis from our own correspondents during the past summer were very few; but it is stated by Prof. James in his November Crop Bulletin as follows:—'The aphis popularly known as the turnip louse appeared in greater force (in Ontario) than for years and hindered the development of the bulbs, which several correspondents describe as being rather small and rooty. The cabbage worm or an insect resembling it also attacks the plant in different parts of the province. Favourable reports regarding the crop were rare.'

'Manilla, Ont., Dec. 1.—I started on an institute trip at Shelburne, Grey county, Ont., and came south and east. We heard great complaints about the Turnip Aphis destroying the turnip crop west of Toronto, but not much damage appeared to have been done east of that city. The early sown fields suffered most, and, so far as I could learn, those fields that were sown after June 20 appeared to be almost free from aphis. I have made it a point to sow my turnips for many years past from June 20 to 22, and we have never had any serious trouble with the aphis. Sometimes we could find a few plants in a place with some on, but not enough to injure even those to any great extent.'—Hy. Glendinning.

There were also restricted but very serious outbreaks in some parts of British Columbia.

'St. Mary's Creek, Gang Ranch, B.C., June 12.—Kindly give me a cure for the lice that settle on cabbages and turnips, completely destroying them. They accumulate by millions. Last season was our first experience. They completely destroyed our whole cabbage plot. I have been in this country 47 years but I never saw them before.' —W. W. Wycott.

'Monte Creek, B.C., Aug. 16.—I send you a few leaves of Swede turnips covered with a pest which has spread terribly quickly and is now going from the turnips to the cabbages. Last year we had some of these, but they were not nearly as bad. It would seem as if the very hot weather and scarcity of water for irrigating is favourable to their increase.'—Hewitt Bostock.

'Cash Creek, B.C., Sept. 23.—I send specimens of a pest which destroyed my turnip crop last year and threatens them again this. Kindly give me the name and some remedy if you know one. If there is none, we must give up trying to grow turnips.'—C. A. Semlin.

Reports of injury by this insect to rape came from Mr. George Wright, of Elora, Ont., and from Ottawa. Dr. Hamilton, of Mahone Bay, N.S., writes of its injuries in his locality as follows:—

'The turnip aphis was abnormally abundant this year, specially on cabbage. I heard of patches in which nearly every plant was affected. We have these insects in some numbers every year, but it is only at intervals and in special localities that the damage is very severe. Perhaps to this is due the fact that hardly anybody here seems

to know of or apply the proper aphis-destroying mixtures which answer well for this as for other species.'

The Turnip Aphis and Cabbage Aphis are the same species. It was probably imported from Europe many years ago and is now a pest right across the continent. In British Columbia it is as a rule much more destructive to early cabbages and cauliflowers in gardens than is the case in the East, where its chief depredations are in turnip fields.

The remedies which have given the best results are the prompt spraying of the first colonies of the season as soon as they appear, with kerosene emulsion or whale-oil soap solution. Of great importance as a means of destroying large numbers of the eggs or of the plant-lice which may possibly winter over as such in Canada (they certainly do so in some parts in the egg condition) is the ploughing down deeply, the feeding off, or the removal from the fields of all leaves of turnips and cabbages as well as remnants of those crops.

The Red Turnip Beetle (*Entomoscelis adonidis,* Fab.).—The usual accounts of slight injury to cabbages and turnips have come in from points in the North-west Territories and Manitoba. Mr. Norman Criddle reports the beetles as rather common at Aweme, Man., on radishes in gardens and on a native food plant, *Erysimum parviflorum,* on the open prairie. For the first time, however, injury by these insects has been reported from British Columbia, from Mr. H. E. Church, of Hanceville, and Mr. C. H. Norris, of Hazleton. The latter writes that it had given great trouble attacking turnips, cabbages, &c., and was worst on young turnips of which it stripped the leaves clean, leaving only the ribs. Specimens were even sent from Dawson, Yukon Territory, by Mr. W. J. Reynolds, who said that they had destroyed cabbages entirely, eating them right down to the stump, and were at the time of writing, July 26, eating the turnips to rags.

Any of the ordinary arsenical poisons for leaf-eating beetles have proved effective against the Red Turnip Beetle. It has been found that dry mixtures are more convenient for use on cabbages and smooth-leaved turnips, owing to their waxy covering. Should it be more convenient to use liquid mixtures, these can be made to remain on the surface of the leaves by adding about a pound of soap to every ten or fifteen gallons of wash.

The Carrot Rust-Fly (*Psila rosæ,* Fab.).—It is some years since we have had a severe attack of Carrot Rust-fly as far east as Ottawa; but early last summer several occurrences were brought to my notice around Ottawa. Some of these were only slight attacks, but in other cases whole crops were destroyed. Strange to say, although so severe in early carrots, there was no appearance of injury when the roots were dug in the autumn. In Nova Scotia and New Brunswick this is a much more troublesome pest of the market gardener than it is further to the west; but even there it is intermittent in its attacks. Dr. C. A. Hamilton writes that in 1902 and 1903 one-half to three-quarters of his carrots at Mahone Bay, N.S., were destroyed by it. In 1904 and 1905 he did not see a single damaged root, although the carrots were sown in the same garden. Notwithstanding this immunity in his garden in 1904, several of his neighbours suffered severely. During 1905 there was practically no injury.

The treatment which has given good results in preventing injury by the Carrot Rust-fly, is to sow as late as possible and when thinning out carrots, to do this late in the day and then spray the rows at once with a deterrent wash such as kerosene emulsion or a carbolic wash. The time when most injury is done is in June and July, so that two or three sprayings, a week apart, will generally protect the crop from injury in ordinary years. Should maggots be found in stored carrots, the sand in which these roots have been kept for the winter should in spring be treated in some way that will insure the destruction of the puparia or will at any rate prevent the emergence of the flies. This may be done either by burying it in a deep hole or by throwing it into a pond or into a barnyard, where it will be thoroughly trampled by stock.

The Diamond-Back Moth (*Plutella maculipennis,* Curtis).—The small active caterpillars of this moth were abundant and destructive in many places during 1905. They did considerable harm in rape fields and on Swede turnips and cabbages, and occurred at various places from Nova Scotia to British Columbia. I have no record of widespread or very serious damage in the East, but there is every indication that, if the summer had been a hot and dry one, the loss would have been very great. As it was, the frequent and copious rains in those places where the outbreaks occurred, enabled the plants to make such vigorous growth that the attacks of the caterpillars were of small moment. It is well known that moisture and continued damp weather are detrimental to this insect. Dr. C. A. Hamilton found the species very abundant for several miles round Mahone Bay, N.S. It also occurred in Prince Edward Island. at Youghall, near Bathurst, N.B., at Ottawa, and at several places in Manitoba, the North-west Territories and British Columbia.

The remedies for this insect are dusting the plants infested with a dry Paris green mixture consisting of one pound of Paris green in twenty-five of lime or wood ashes, or spraying them with kerosene emulsion or a whale-oil soap solution. To allow of the mixture being thrown well up under the leaves such a convenient implement as has been given to me by Mr. Geo. E. Fisher, of Freeman, Ont., should be used. This consists simply of a short length of metal pipe bent in the middle to the required angle and having the nozzle attached to one end. As a supplementary treatment inducing a vigorous growth, light dressings of some quick acting fertilizer such as nitrate of soda, hoed in round the roots of the plant, are of great advantage.

The Cucumber and Potato Flea-Beetle (*Epitrix cucumeris,* Harr.).—A serious enemy to potatoes, but one which is frequently overlooked, is the so-called Cucumber Flea-beetle. This minute dusky-black hopping beetle, about one-twelfth of an inch in length, appears early in spring and again about the beginning of August, and sometimes in such numbers that it becomes a serious check to potatoes, tomatoes and all kinds of cucurbits or members of the Gourd family. A remarkable outbreak of this beetle occurred in Nova Scotia last August.

'Mahone Bay, N.S., August 14.—We have the Cucumber Flea-beetle here on potatoes more or less plentifully every year especially in June; this spring, however, I thought they were not as abundant as usual. On August 3 I looked over my potatoes for the Colorado Potato Beetle and do not remember seeing any flea-beetles at all. On August 5 one side of the patch was simply alive with them, and by the next day they had spread over the whole patch. I partly counted and partly calculated the number and found them to average about 800 to each plant. By the 9th they had destroyed between a quarter and a half of the leaf surface of the side of the patch first attacked. That afternoon I gave them a dose of poisoned Bordeaux mixture. On the 11th they had practically disappeared. A neighbour's potatoes about 150 yards away were nearly as badly infested as my own. I have an idea that the poisoned Bordeaux mixture may act rather by driving the beetles to adjacent vegetation than by killing them. After they left the potatoes they turned their attention to cucumbers, beans, pumpkins, squashes and tomatoes which were badly eaten. On account of this troublesome pest it is almost impossible, without the most careful attention, to raise tomatoes here from seed sown in the open, because they sweep away the young plants as soon as they appear above the ground.'—C. A. Hamilton.

The efficacy of the poisoned Bordeaux mixture for this insect was discovered by Prof. L. R. Jones, of Vermont, in his very thorough experiments with Bordeaux mixture against the Potato Rot. It is probable that the copper sulphate in this composition does have much effect in rendering the foliage distasteful to the beetles; but there is also little doubt that great numbers of the beetles eat the foliage and are poisoned. This useful remedy is suitable for application to all of the plants mentioned above and is also useful upon them in preventing fungous diseases which regularly attack them.

THE SUGAR BEET WEBWORM (*Loxostege sticticalis,* L.).—In my report for 1903 I referred to an outbreak of the Sugar Beet Webworm in the West and treated it at some length, so that in case of a future outbreak those who are now turning so much attention to the cultivation of the sugar beet in the Cardston district of Alberta, might be prepared. During the past autumn I received an account of a local occurrence in that district. Mr. J. B. Merrill, who is a most progressive farmer and fruit grower at Magrath, Alta., writes on August 25:—'I send you by this mail specimens of worms which are destroying our beet crops here at an alarming rate. I take them to be the Sugar Beet Webworm of your 1903 report. What had we better do to control them? We are spraying them with Paris green now, but the beets are stripped of their leaves. Do you think that they will survive the attack and be of any use?'

Mr. Merrill was written that he had applied the right remedy and that the plants would certainly revive, but would be injured to the extent that the leaves had been destroyed, and that, although the roots would be reduced in size, they would probably still give a paying crop. That this proved to be the case is shown by a later letter from Mr. Merrill:—

'Magrath, Alta., Nov. 3.—I have to day delivered the last load of my beets on the cars, so am now in a position to answer your questions. I had a very good stand of beets on my 17 acres. Towards the end of August, after a three days' absence, I was surprised to find the plants covered with worms. Part of the field had been irrigated. Here the plants were not as badly affected as where they had no water. These latter were swept clean, but they afterwards started a new growth of leaves, and from this part of the field I harvested only four tons to the acre; but the watered beets yielded 13 tons to the acre. When ploughing up the beets, we found enormous numbers of the worms about two inches under the surface of the soil. These we hope to destroy by winter cultivation. I think that the moths must have come from an adjoining lucerne patch.'

THE SPINED RUSTIC (*Barathra occidentata,* Grt.).—During the month of July a great many different kinds of plants in gardens were attacked at Ottawa by large, smooth, cutworm-like caterpillars, which were at first greenish in colour, having the body divided into two equal areas above and below the spiracles. The upper of these areas, or the back of the caterpillar, was darker by reason of some black patches, and the under side of the body was of a yellowish hue. These rather inconspicuously marked caterpillars were largely nocturnal in habit, coming out at night and feeding singly on nearly all kinds of vegetation, but being particularly destructive to the seed pods of larkspurs and to the foliage of the bleeding-heart (*Dielytra spectabilis*). In the vegetable garden, spinach and cabbages were most attacked. After the last moult, about the middle of July, these caterpillars were much more conspicuously marked, presenting a handsome Mamestra-like appearance, with three lines down the back and with each segment ornamented with large velvety black patches; the head is honey-coloured and mottled. When full grown these caterpillars are very voracious. They are about two inches in length, cylindrical in shape like cutworms and attain a diameter of nearly $\frac{1}{4}$ of an inch. There is great variation in their colours, some specimens appearing to be almost black while others have a dark olive green aspect; but all specimens show a distinct band along the sides below the spiracles, which is clear yellow in colour, marked centrally with red. These caterpillars were the progeny of a noctuid moth which up to the present time has been a very rare species in all collections of insects. It has been identified for me by Dr. J. B. Smith, as *Barathra occidentata,* Grt., an insect which is so rare that the only two specimens I had ever seen were two reared by Mr. Guignard from larvæ which he had found upon larkspurs in his garden in 1898. Mr. C. H. Young, of Ottawa, an energetic collector of moths, also took a single specimen on June 6 of the same year, and another one the following year on

June 19. During last summer, while collecting moths at Ottawa, we found that this species was well represented among captures which we made during the month of June around electric lights; and several more specimens were collected hiding away in dark corners of offices and out-buildings. A few weeks later than this, caterpillars were found in great abundance out of doors on various kinds of plants. These we were able to identify by comparing them with specimens which we had reared from eggs laid by captured females. We were fortunate enough to work out the whole life history of the species. There is only one brood in the year, the eggs being laid in June and July and the caterpillars feeding through July and into August. When full grown they bury a few inches beneath the surface of the ground and change to shining brown chrysalids, from which the moths do not emerge until the following June. The moth is a handsome insect, expanding over an inch and a half when the wings are open. The upper wings are a dark silvery gray, so thickly checkered and marked with waved blackish lines as almost to hide the ground colour; hind wings silvery gray clouded with fuscous on the outer half. Near the end of the upper wings is a waved white line. The outer or kidney-shaped of the two marks which are characteristic of noctuid moths, is margined with black and is boldly marked with white; but the other, the orbicular, is hardly perceptible from the other marks of the wings. On each of the upper wings are three rather large suffused pale, bronzy areas, one close to the base, and the other two towards the upper and lower angles. The upper of these lies beyond the kidney-shaped mark and just inside the waved white line which runs down inside the outer margin. The thorax and abdomen are crested and of the same colour as the general tone of the wings. The genus *Barathra* to which this moth belongs, is easily distinguished from its near relatives by the presence of a long curved claw on the outer side of the tibiæ of the front pair of legs.

Not only did this insect occur in abundance at Ottawa, but specimens were sent from Mahone Bay, N.S., where my energetic correspondent, Dr. C. A. Hamilton, makes many very valuable observations for me. Dr. Hamilton found the caterpillars when they were quite small, upon cabbages, turnips, cauliflowers, corn and sweet pease. They were, at the time he first wrote, July 23, quite small, and were of the green colour which characterizes the first stages. Like the larvæ of many other noctuids, while very young, they resemble in shape and manner of moving those of the geometer moths. Dr. Hamilton writes:—'Aug. 11.—I am sending you some more of the caterpillars which I find on my cabbages and cauliflowers. I have also found them on sweet peas and on one small patch of Kohlrabi. I also send a few from corn. I have examined nearly all the patches of these vegetables about this village and from one to six miles out in various directions, and have found them present in all but a few cases. The damage, on the whole, is not very great, the worst perhaps being in a small patch of cabbage in which I counted 14 out of 70 plants, so badly eaten as to be worthless. A few other patches were nearly as badly injured, but most had only from one to five per cent noticeably affected. Turnips were infested to about the same extent. Cauliflowers are not much grown here, but I saw many plants almost ruined. The attacks were confined almost entirely to the cultivated Cruciferæ. Fresh batches of young were being hatched from the egg until up to about August 1.'

Moths of this species were taken at Lévis, Que., by the Rev. Dr. Fyles, and I found the caterpillars in great numbers stripping a patch of cabbages in the garden of Mr. W. McKirdy, at Nepigon, Ont., on August 21. These were very much later than at Ottawa, where most of the larvæ had attained full growth two or three weeks sooner.

As a remedy for this insect, almost any of the ordinary applications for leaf-eating insects would answer; but I found them less susceptible than I supposed would be the case, to an application of pyrethrum insect powder. There is, of course, the possibility that the powder may not have been good; but it did not kill the caterpillars as quickly as is the case of most other similar caterpillars upon which I have tried it. The poisoned bran mash answered well at Ottawa.

FRUIT CROPS.

The fruit crops from one cause or another were somewhat irregular, except in British Columbia, where they were well up to the average and of high quality.

In Ontario, although a good crop of apples was marketed, there were districts where they were poor. This was thought to be largely due to the severe winter of 1903-4, followed by the very heavy crop of last year, followed again by the hard winter of 1904-5. Apples in the Ottawa district, where the orchards had been sprayed, were of high quality and abundant. Heavy wind storms in October reduced the yields of first-class fruit to some extent.

The St. Lawrence and Ottawa valleys and the Eastern Townships of Quebec gave good crops of autumn and early winter apples, but very light crops of winter varieties.

Mr. A. McNeill, Chief of the Fruit Division of the Department of Agriculture, in summing up the apple crop for the year says:—'The Dominion, as a whole, will produce about one-third as many apples as last year. The fruit will be freer from scab, but somewhat more injured by Codling Moth. The favourable weather of autumn allowed the numerically small crop of apples on the trees to fill up better than usual; and, although the apples are on the whole rather small, they are clean and of good quality, and probably the final result will give average paying returns to the growers.'

The apple crop in Nova Scotia is reported as being below the average on account of a heavy frost in June, which injured the blossoms; nevertheless, it is estimated that there were probably four hundred thousand barrels for export and the local market, worth at current prices close to one million dollars.

Mr. S. C. Parker, Secretary of the Fruit Growers' Association of Nova Scotia, reports on the crops of the celebrated Annapolis Valley, N.S.—'Apples: crop fair, probably 75 per cent of average, quality varying from good to very poor; fungi quite bad although thorough spraying gave some clean orchards. The pear crop was large, but of rather poor quality. Plums and small fruits gave good crops. A severe frost on June 6 did much injury to blossoms, and perhaps easterly winds and dull weather during the blossoming period did more. Early fall frosts injured the cranberry crop somewhat. A sharp freeze on October 26 ruined many hundred barrels of unpicked apples. Season was very favourable except for one or two frosts.'

Losses from the attacks of injurious insects were less than usual in all parts of the Dominion, owing to the much greater attention which is now being given by fruit-growers to spraying and other advanced methods of orchard management. Peaches in the Niagara district and in British Columbia, where grown, were a heavy crop. Much the same may be said of pears and plums. Plum rot and curculio are mentioned in Northern Ontario reports. The grape crop of Ontario was heavy, and as there were no killing frosts till very late, the fruit ripened well.

Small fruits almost everywhere gave fairly good crops. The insects which were oftenest mentioned as injuring fruit crops were the San José Scale, the Codling Moth, the Apple Woolly Aphis, which has been more abundant than for many years, the Apple Aphis, the Oyster-shell Scale, and the Cherry Slug. The Apple Maggot mentioned in my last report as present at Como, Que., was this year much more prevalent in that locality, and a special effort was made to apprise the fruit growers of the best remedial measures and the danger of neglecting to attend to the matter at once.

Notwithstanding the magnificent crop of fruit gathered in British Columbia, there was considerable injury done by regularly occurring insect pests. The Woolly Apple Aphis and the Green Apple Aphis were very abundant in some places and did noticeable injury. According to Mr. R. M. Palmer, who has excellent opportunities for examining the crops throughout the province, the Eye-spotted Bud-moth has been worse than for many years in the Victoria district. The injury of this caterpillar was also much augmented by a late frost in May. Mr. Thos. Cunningham, the In-

spector of Fruit Pests, reports the Lesser Apple Worm as abundant and destructive at Kamloops and Trail.

THE SAN JOSÉ SCALE (*Aspidiotus perniciosus,* Comstock).—Much has been written recently in newspapers and magazines on the San José Scale injury in Ontario, but there is, as a matter of fact, little change in the condition of our orchards in Ontario since last year. This in itself is not satisfactory, because, where careful commercial growers have attended to their orchards properly, and have used the recommended remedy, good clean crops have been harvested. There are, however, a great many small growers and private individuals who do nothing at all against the scale, and consequently it holds its own. The Federal Government still maintains at considerable expenditure fumigation stations, by which any danger of the introduction of infested stock is prevented. The Provincial Government of Ontario and the leading nurserymen are making every effort to avoid the distribution of infested nursery stock, and, if a greater effort were put forth by all concerned, this dire enemy of the fruit grower could certainly be reduced very much in numbers.

I regret to have to state that I have this year received specimens of the San José Scale from two localities in British Columbia. The attention of the Provincial Government has been drawn to the matter, and the few trees which are infested in both cases will be destroyed before another season opens. The first of these was discovered by Mr. J. W. Cockle, of Kaslo, B.C., a keen entomologist and one therefore well able to detect the enemy and give advice to the owner of the trees. It is satisfactory to find that in both of these cases the trees have been planted for a long time and date back previous to the enforcement of the San José Scale Act and the establishment of the fumigating stations.

For the San José Scale more careful treatment and persistent effort is necessary than for many other insects the fruit grower has to deal with. The standard remedy is the lime and sulphur wash which has so often been mentioned in these reports and for the making of which and instructions in its application, necessary information will be given to any one who applies for them. Prof. J. B. Smith of New Jersey recommends very highly two recently sent out proprietary mixtures : Kil-o-scale and Scalecide, which have given good results with him. They are petroleum preparations which have been prepared largely under Dr. Smith's supervision.

THE CODLING MOTH (*Carpocapsa pomonella,* L.).—The Codling Moth, which on the whole, perhaps, is the worst enemy of the fruit grower, has levied a heavy toll as usual in unsprayed orchards; but, wherever thorough work has been done in spraying regularly with the poisoned Bordeaux mixture, good results have almost invariably followed. In every part of eastern Canada where apples are grown, reports speak of injury by this insect and, as is pointed out by the Rev. Father Burke, possibly the comparative scarcity of fruit this season makes the injury by the Codling Moth seem more apparent. There is now not the slightest doubt that in all parts of Canada east of Toronto spraying orchards regularly with poisoned Bordeaux mixture, three or four times in spring, the first application to be made within a day or two after the blossoms fall and the subsequent sprayings, each ten days apart, is a satisfactory and well paying remedy for the Codling Moth. A striking instance of the value of regular spraying, year after year, was this year to be seen in the orchard of the Central Experimental Farm at Ottawa, where not an apple injured by the Codling Moth was to be found, whereas, on the other hand, in orchards just close by, where no spraying had been done, more than half the crop of apples was destroyed, also in the Botanic Garden, which lies about half a mile on the opposite side of the orchard, in the collection of wild apples and crabs, the fruit was severely infested. These it had not been considered worth while to spray, as the trees are merely grown for ornament.

The Codling Moth is normally single brooded at Ottawa and the double brooded habit of the species is not general east of Toronto. In 1905 I had an opportunity of

rearing a considerable number of the larvæ and was much surprised to find that some of these after spinning their cocoons changed at once to pupæ and gave forth the moths soon afterwards. These, however, formed only a small percentage of the whole, for by far the larger number remained in the larval state and will not pupate until next spring. The above larvæ were full grown and began to spin up July 25, and I am of the opinion that not only at Ottawa, but at some other places in eastern Canada where a partial second brood was this year noticed, this premature development of the moths was due to about a fortnight of excessively and exceptionally hot weather in July as they were nearing full growth.

West of Toronto, in addition to regular spraying, banding the trees with burlap bands to catch the larvæ of the first brood when they spin up is necessary.

It has long been a matter of wonder that the Codling Moth, which is so abundant in the States of Oregon and Washington, should not have established itself as an injurious fruit pest in British Columbian orchards. Although carefully sought for, no instance of apples infested by this insect have been detected until the present season. An insect which causes a somewhat similar injury, the Lesser Apple Worm [*Enarmonia* (Grapholitha) *prunivora*, Walsh] has frequently in the past been mistaken for the Codling Moth in British Columbia; but, with the exception of a single specimen of the moth sent to me by the Rev. J. H. Keen, from Metlakatla, B.C., where no apples are grown, and which he had found in his house, I have never been able to learn of the occurrence of this insect in British Columbia until Mr. J. W. Cockle, of Kaslo, B.C., sent me this autumn an undoubted specimen of the Codling Moth, which he had reared from infested apples growing in an orchard at Kaslo. It is deeply to be regretted that this insect has found a foothold in British Columbia, although this at some time was almost inevitable, from its abundance in orchards to the south. It is well for the province that Mr. Cockle, being a trained entomologist, should have been able to detect both this insect and the San José Scale before they had spread further. The matter has been brought to the attention of the Provincial Government and it is their intention to deal with both of these occurrences before another season opens.

The Woolly Aphis of the Apple (*Schizoneura lanigera,* Hausmann).—An insect which has been strikingly more abundant during 1905 than it has been for many years, is the Woolly Aphis of the Apple. This has been noticed all through Ontario and Quebec, and Mr. R. M. Palmer tells me that it has been more destructive in British Columbia than for many years. The injury by the Woolly Aphis is sometimes very severe in the United States, particularly by the root-inhabiting form of the species; but it has never been a very serious pest in Canada; even in British Columbia, where it is regularly much more abundant than in the East, it is less destructive than the Apple Aphis and some other well known enemies of the fruit grower. The eradication of this pest when it has established itself upon the roots of apple trees in an orchard, is a difficult matter. The methods which are usually adopted, are the uncovering of the roots and pouring in hot water almost at the boiling point, or the injection into the soil of bisulphide of carbon. Another method which has been highly praised, is digging in tobacco dust around the roots. This material can be purchased, it is claimed, from cigar factories at a reasonable amount, and, when this does not exceed one cent per pound, the tobacco is worth fully that price as a fertilizer. The form which occurs in Canada most widely, is that which may be seen during the summer and autumn gathered together in white woolly clusters on the shoots from the base of the trunks of neglected trees and upon the branches, where they cause swellings in the bark by sucking the sap and at the same time poisoning the tissues. In the vicinity of Ottawa the wild hawthorns were even more seriously attacked than apple trees in orchards, although some of these latter were so infested that one correspondent spoke of them as presenting the appearance of having been whitewashed.

The remedies for the form which occurs on the branches, are the same as are used for ordinary plant-lice; but, as these are protected by a waxy covering, it is well to

apply the liquid with considerable force and also to have it mixed with hot water which gives it greater penetrating power. A kerosene emulsion may be made for this purpose, of the standard Riley-Hubbard emulsion diluted with six, instead of nine parts of water. Whale-oil soap solution should be applied hot and one pound in five gallons of water.

THE APPLE MAGGOT [*Rhagoletes* (Trypeta) *pomonella,* Walsh].—In the autumn of 1904 an outbreak of the Apple Maggot, known also in the New England States as 'the railroad worm,' was detected in some of the apple orchards at Como, Que. During the past season it has been found that the insect has established itself in many other orchards surrounding the first point of injury.

As there are several large and valuable orchards in this locality, much anxiety was felt by the owners of these, that the habits of the insect and the best remedial treatment should be made known to all apple growers of the district, so that by concerted action the outbreak should be controlled before more loss accrued. With this object in view, I visited Como early in October, and examined several of the orchards under the guidance of Mr. R. W. Shepherd, who kindly put himself at my disposal and accompanied me, and also helped me in many other ways to get into touch with the owners of several orchards.

One of Mr. Shepherd's own orchards had been affected last year, and this summer he had faithfully carried out suggestions of control based on the experience of those who had suffered from the Apple Maggot in other places.

All windfalls had been fed to cattle, and a herd of pigs had been kept in the orchard throughout the summer. It may be well, however, to point out, as the experiment will be anxiously watched by his neighbours, that some badly affected crab apple trees were in a sense overlooked, the fruit of which was thoroughly infested at the time of my visit. It would appear that the fruit of this class of apples does not fall from the trees when attacked, to the same extent as the larger apples. At that time, however, Mr. Shepherd at once had the fruit of these trees threshed from the boughs and destroyed. A circular letter giving the nature of the pest and advice as to the best treatment of infested orchards was at once prepared and a copy sent to every apple grower in the district. Notwithstanding the severity of the outbreak, the experience of others who have suffered loss from the Apple Maggot, would seem to give reasonable ground for hope that much may be done to reduce loss. The following letters from the State Entomologists of Maine and New Hampshire respectively, show that good results have followed the adoption of the best, so far, recognized method of prevention. The insect has been present in these States for some years.

'Agricultural Experiment Station, Orono, Me.—Your letter concerning the Apple Maggot is received. There seems to be no marked change from year to year in the occurrence of this pest here. We have in the State numerous orchards in which the trees have not been pruned for a generation at least and in which the windfalls lie ungathered. The owners of such orchards frequently complain that the trees might as well be cut down, for the "Railroad Worm" gets all the apples. On the other hand, *none of the leading orchardists seem to feel that the case is hopeless.* They recognize the Apple Maggot as a pest to guard against and believe that care in putting the windfalls out of the way is the only practical method of doing it. Thus, it is no uncommon situation to have well cared for orchards where infestation by *R. pomonella* is almost unknown, while within a few miles the owners of neglected trees say that for years they have not gathered a crop. There is one notable case of this sort in the southern part of the State, where in the midst of an infested area a very large orchard ships perfect apples every fall and no loss is caused by the maggot.

'A few successful orchardists think it pays to keep a few sweet apple trees scattered about as traps, as the flies seem always to deposit in these by preference; and the whole situation is sometimes handled by sacrificing some sweet fruit and subsequently destroying this infested lot. I trust that the outbreak near Montreal will not prove so serious as it seems at present.'—EDITH M. PATCH.

'New Hampshire College of Agriculture and the Mechanic Arts, Durham, N.H.—I have not heard of any serious trouble from the Apple Maggot this year, although it is quite common in our summer apples. I think it is somewhat worse this year than last year; but it has not caused any very serious injury, so far as I have heard. It becomes seriously injurious periodically.'—E. D. SANDERSON.

THE BUFFALO TREE-HOPPER (*Ceresa bubalus*, Fab.).—A great many specimens of rough and gnarled twigs of apple trees have been sent in from time to time, but more frequently during the last year or two, which were due to the injuries caused by small grassy-green homopterous insects that bear on the thorax two horns which are supposed to give it a resemblance to the buffalo. The only harm done by this little insect to orchard trees is by the egg-laying females, which cut two semi-circular gashes right through the bark deeply into the wood, and into each of which they insert from five to ten eggs. Each female lays between one and two hundred eggs, and consequently makes several of these gashes before she has deposited her whole supply. The eggs remain in the wood and do not hatch until the following June; each egg is about one-sixteenth of an inch long, slightly curved and yellowish white in colour. When the young hatch, they crawl out of the egg-shell which remains in the wood and prevents the wound from healing up for a long time. Young twigs of two or three years old are frequently selected by the females for ovipositing, and, if there are only a few of the scars, little injury is done; but it seems to be a habit of this insect to work somewhat in company, and frequently a single tree may be found with a great many egg-deposits in the wood, while others close by are untouched. The two slits almost meet each other but do not quite touch at the top and bottom, but the small piece of wood and bark between them dies and, together with the empty egg-shells, prevents the healing of the wound, so that, where there are many deposits on the same tree, the injury is serious and a check is sometimes given to young trees, which they do not get over.

The Buffalo Tree-Hopper while young lives chiefly upon the sap of weeds and other coarse vegetation, and very little of its food is derived from the apple trees where the young larvæ are first hatched. For a few days, at any rate, after they have first hatched, they may be seen on the trees running quickly round the branches and hiding whenever looked at. At this time, which, however, does not last for many days, good work may be done by spraying the infested trees with kerosene emulsion or whale-oil soap. It is very difficult to reach the eggs by any winter treatment, but probably spraying with crude petroleum or an emulsion of that oil might be applied without injury to the trees. The remedy recommended by Mr. C. L. Marlatt, the First Assistant United States Entomologist, is the limiting of the amount of foreign vegetation about and in orchards and nurseries. He thinks that little damage may be anticipated where the ground between the trees is kept clean and constantly cultivated. Vigorous pruning in winter, by which as many as possible of the egg clusters are removed, is also advised. The mature insects seem to be attracted by beans and some other low-growing vegetables. These then might be planted in orchards between the trees as trap plants to be afterwards sprayed with strong mixtures of kerosene emulsion or whale-oil soap, when the larvæ, nymphs or adults are seen to be numerous enough upon them to make it worth while. The time recommended by Mr. Marlatt is about July 1.

THE WESTERN HARVEST-FLY [*Cicada* (Platypedia) *putnami*, Uhler].—An extremely common insect in most parts of British Columbia, is a species of Cicada of about the same size as the well known *Cicada septendecim*, L., of the United States. This latter is known under the erroneous name of Seventeen-year Locust, but, so far as I can learn, has been never or very seldom taken in Canada. The Western Cicada is enormously abundant nearly every year in Vancouver Island in June; and I have found it in like numbers in the Kootenays, particularly at Nelson, where in the begin-

ning of July in 1896 the shrilling of the males among the aspen poplars and willows on the mountain side above the town was almost deafening. The species occurs right across the mountains, as I have specimens from Banff, and last year Mr. Dalton Tipping sent me a specimen which he had taken at Blackfalds, in Alberta.

Up to the present season no injury to cultivated trees had been complained of in British Columbia, but on July 3 last, Mr. E. Hulme, of Rock Creek, in the Boundary District, B.C., sent me samples of apple branches which had been punctured by the egg-laying females. As in the case of the other species of the genus, *C. putnami* lays its eggs in deep slits made into the wood of various trees; but the young do not feed on the wood or foliage of the trees where the eggs pass the winter; on emerging, they fall to the ground and burrow into the earth, where they attack the roots. Mr. Hulme stated that his young apple trees had been planted four years, and he had not previously noticed any injury; but this year some of the branches had been cut in four or five places.

It is hoped that this may be only an accidental injury to apple trees; but British Columbia is now becoming such an important fruit producing country and such large areas are yearly being cleared and planted to orchards, that any insect which is likely to develop into an enemy of the fruit grower is worthy of attention.

The Sleepy Weevil (*Otiorhynchus ovatus,* L.).—In my last report reference was made to the attacks of the larvæ of this weevil on the roots of strawberries. The insect occurs right across the continent and is frequently sent to the Division for information concerning its habits; but this is usually on account of the frequency with which it is found crawling about inside houses. Complaints of injury to vegetation are seldom made; but occasionally the damage done by the larvæ is considerable. Mr. E. McTaggart, of Hatzic, B.C., wrote as follows last spring:—'May 3.—I am sending a box containing a number of small white grubs. This insect has been working for the past three or four years in our strawberries, feeding on the small white root feeders. They bid fair to put us out of the strawberry business, unless we can find some way to control them. This will be a serious loss; for strawberries are our most important crop.'

Specimens sent from British Columbia previously, showed that the larvæ of the Sleepy Weevil have also the habit of boring cavities into the caudex or short underground stem of old strawberry plants, in the same way as, and frequently in company with, the larger larvæ of the Black Vine Weevil (*Otiorhynchus sulcatus,* Fab.). Mr. McTaggart was advised to adopt the 'one-crop method' of growing his strawberries, by which finer berries are produced and the beetles are prevented from increasing. I find also that large numbers of the mature beetles may be trapped by putting shelters, such as small flower-pots with a little hay in them, inverted and raised from the ground on short pegs, about the beds. The beetles are largely nocturnal in habit and will make use of these shelters for hiding in by day. They can be easily cleared out by taking each pot off the peg and shaking the hay over a pan or pail with a little water and coal oil in it. They are remarkably sluggish insects and make no effort to crawl away by day.

Father Burke sent specimens from Alberton, Prince Edward Island, which he had found eating cavities into low growing apples; many fruits trailing on the ground were damaged. He had also found the beetles in the blooms of dahlias and eating the leaves of the wild buckwheat.

Mrs. Thomas Sharpe, writing from the Experimental Farm at Agassiz, B.C., on August 9, sent specimens of the Black Vine Weevil which had been found very plentifully on the raspberry bushes, and also several Sleepy Weevils which she said 'we find all over the house. Do we carry them in on our clothes from the garden or are they some destructive house insect? We are quite alarmed at the numbers of them which we find about the floors.'

It is probable that some of these may have been carried into the house from the garden; but these insects have a well marked penchant for crawling into houses and

other places where they are decidedly objected to by housekeepers. Neither the Black Vine Weevil nor the Sleepy Weevil have wings; so they cannot fly like most other beetles and can only move from place to place by crawling.

THE STRAWBERRY WEEVIL (*Anthonomus signatus,* Say).—It is some years since a bad outbreak of the Strawberry Weevil has occurred in Canada; but in June last I learnt from Mr. Sydney H. Preston, of Clarkson, Ont., which is a few miles west of Toronto and an important strawberry producing district, that a great deal of damage was being done in the extensive strawberry plantations of that locality. Mr. Preston writes:—

'Clarkson, June 9.—I inclose some strawberry blossoms cut by the insects which are sent with them in the box. They are doing a great deal of damage in this locality.'

'June 17.—I grow only a few strawberries for my own use and have not seen the weevils on my own place, though I find many buds and blossoms and small berries cut through the stem, as in the inclosed sample; but my neighbours are all large growers and the complaint of damage is general. The cutting of the fruit stems is also attributed to this insect, but possibly that may be a mistake. Last season was the first in this locality that the injury was noticeable, and many growers then feared that their crops would be ruined. However, there seemed to be an abundance of fruit in spite of this.'

The habits of the Strawberry Weevil are interesting. It passes the winter in the mature beetle form, and, just before the flowers of the strawberry unfold, the insects fly to the strawberry beds and may be found in large numbers upon the flowering stems. When the female lays her eggs, she punctures a closed bud, for which purpose she generally chooses the earliest and largest. This is done with her sharp and slender beak, and the hole penetrates to the centre of the bud. She then deposits a single egg, pushing it down into the hole. Having done this, she crawls to the stem of the flower and gnaws it nearly through, so that the bud hangs down and eventually drops to the ground. Inside the cut off bud the young grub hatches and passes through all of its stages, the dead flower remaining closed around it as a protection. When the grub is full-grown, it forms a brittle cocoon of the debris, and in about a month from the time the egg is laid, the perfect beetle eats its way out. The new generation of beetles may frequently be found at Ottawa in the latter half of July and early in August. There is only one brood of this beetle, as far as known, and, as all the beetles disappear suddenly in the beginning of August, it is supposed that they go into hibernation at that time, hiding away beneath moss or among bushes and perhaps in woods, where they remain in a lethargic condition until the following spring. The varieties of strawberries chosen by the females for egg-laying are always those which produce pollen in considerable quantities, and it is chiefly upon the pollen that the larvæ feed. Varieties of strawberries with entirely pistillate flowers are not attacked; consequently, when the Srawberry Weevil is abundant, growers will do well to plant pistillate varieties as much as possible, and only enough plants of varieties which produce perfect flowers (which have both stamens and pistils) as will ensure the proper fertilization of the fruit. The number will to a large measure depend upon the variety grown and the number of flowers produced. Among the standard varieties of strawberries most highly recommended by Mr. W. T. Macoun, the Horticulturist of the Central Experimental Farm, the following may be mentioned as having proved the most satisfactory for general purposes, after being tested for several years:—

Pistillate.	Perfect.
Sample.	Glen Mary.
Buster.	Beder Wood.
Bisel.	Enhance.
Greenville.	William's.
Marie.	Lovett.
Warfield.	Pocomoke.

A reference to the good qualities of each of these varieties is made in the Report of the Horticulturist for 1904 at page 121.

Many experiments have been made to discover a practical remedy for this troublesome insect, which at different times has done a great deal of harm in Canada. Many years ago I suggested covering the plants just at the time the beetles appear, with gauze, cheese cloth, or even paper; but these methods all have the very great disadvantage of excluding the swarms of flies, bees and other insects which frequent the flowers and aid in the fertilization. Trapping the mature beetles when they fly to the plants, it is claimed, has produced good results. For this purpose the pollen-bearing plants should be planted in rows so that they may be sprayed when found to be covered with the beetles, either with a whale-oil soap solution or a kerosene emulsion. As has been pointed out by Mr. F. H. Chittenden, in an excellent bulletin on this subject (U. S. Div. of Ent. Circular 21, 2nd series, 1897), 'for the complete success of this method, it is essential that the non-fertilizing plants (the main crop) should be perfectly pistillate and bear no pollen at all.'

The Currant Maggot (*Epochra canadensis,* Loew.).—Injury to currants both black and red by the larvæ of the Currant Fly are somewhat frequent in the West, and, unfortunately, up to the present time no very satisfactory remedy has been devised. The only treatment which has given any results, is the laborious one of removing about three inches of the soil from beneath bushes which had been infested, replacing this with fresh soil, and then treating the infested soil containing the puparia, in such a way that when the flies mature they cannot emerge. The following letters were received during the past summer:—

'Rock Creek, B.C., June 27.—I send to-day samples of gooseberries and currants which are affected with white maggots. I should like very much to know what we can do to avoid this pest. Last year we tried spraying with quassia chips and whale-oil soap solution, from the time the blossoms opened out; but it did no good whatever. The fly seems to lay her eggs when the berry is almost full grown. We have over 100 bushes and all are a complete loss. We have tried putting unslaked lime under the bushes, and we keep them well trimmed up; in fact, some of our currant trees are two and a-half feet high, but all are affected in the same way.'—Mrs. Bart Inghram.

'Indian Head, N.W.T., July 3.—I send you a few currants to show you how badly affected they are. At least half the crop was stung early in the season and fell off. Those that remain on the bushes, are in the condition of these I send you. In a recent trip through Kinistino, Melfort and the other districts around Prince Albert, through which we travelled together five years ago, I noticed that the currants were all affected in the same way. It would be of advantage, I think, if you could advise farmers what to do to save their fruit.'—Angus Mackay.

'McLean, Assa., July 3.—I am sending a few currants which are infested with some insect. They are beginning to fall off now. This is the third year they have been infested; but I can't find out what kind of insect it is, although I often hunt for it.'—W. J. Fanning.

The maggots are very hard to recognize when at work in the currants, and many correspondents, like Mr. Fanning, have had difficulty in detecting them. They were however, present in the specimens which he forwarded. In addition to the measure suggested above, of removing the earth from beneath infested bushes, it is claimed that much good has been done by allowing poultry to run in a plantation where the Currant Maggot is known to be infesting fruit. The birds scratch beneath the bushes and destroy large numbers of the puparia. It is probable that the eggs are laid by the female flies when the currants are quite small, as freshly emerged flies were sent to me from Vancouver Island under the date May 20.

FOREST AND SHADE TREES.

No extensive injury to forest or shade trees by insects has come under my notice during 1905, but there have been local outbreaks of some importance. In Alberta the Forest Tent Caterpillar has again stripped aspen poplars, and mention has been made of its work on maples and in orchards in Nova Scotia. There are also indications that Tent Caterpillars are again on the increase in Ontario and Quebec. The Larch Sawfly (*Nematus erichsonii,* Hartig), which appeared in a few places last year upon the native tamaracks and imported European larches, was this year much more abundant, and for some hundreds of miles along the Canadian Pacific Railway between Ottawa and Lake Superior had stripped the young tamaracks growing in the swamps along the railway. Occasional mention was also made by correspondents of the work of this insect in the Maritime Provinces. An insect which has not previously been recorded as doing harm in Canada, the Larch Case-bearer, has this year been found in considerable numbers at Ottawa on the European larch. The Negundo Plant-louse which has occasionally been so numerous upon the cultivated and wild Ash-leaved Maples in Manitoba and the North-west Territories, was again extremely abundant in some places this year. The Cottony Maple Scale (*Pulvinaria innumerabilis,* Rathvon), which for several years has been abundant on the shade trees in some of the cities of western Ontario, was during 1905 even more so than in previous years. The outbreaks of the White-marked Tussock-moth, which in previous reports have been referred to in some Ontario cities, and in Montreal, have attracted much public attention, and at last efforts are being put forth by the municipal authorities in various cities to control these destroyers of the public shade trees. In Vancouver Island, the oak-looper *Therina somniaria,* Hulst, which was complained of as being abundant last year, during 1905 swarmed in countless numbers over the oak trees in the vicinity of Victoria, B.C., and stripped them of their leaves. The Spruce Gall-louse was exceptionally abundant in 1905, and requests for information as to its life habits and the possibility of its becoming a destructive enemy of Canadian spruces, came in from many correspondents in all parts of the country. The ornamental cedars on the Central Experimental Farm were very much disfigured by the mining larvæ of a very small moth belonging to the genus *Argyresthia.* The moths appeared at the end of June and were found flying in clouds around all varieties of the American Arbor-vitæ, or so-called White Cedar. The full life history and the exact identity of the species are not yet worked out; but young larvæ were found in the twigs early in spring, the moths emerged in the latter half of June, and the young larvæ are at present in enormous numbers passing the winter inside the small twigs. As yet, no parasites have been bred. What was apparently this same species, was sent to me in 1899 by Mr. Thos. Ware, from Plattsville, Ont., Writing of this occurrence, Mr. Ware says: 'The insects did my cedars considerable damage in 1899; and not only mine, but whole cedar swamps lost their green and looked quite brown. The trees have since been slightly affected each year, but not to any great extent. I saw a few of the insects this summer but the hedge has not suffered.' The injury to ornamental shrubs, and there are many varieties of the white cedar grown as such, has certainly been serious this year at Ottawa. So far, no remedies have been tried. The Fir Sawfly, *Lophyrus abietis,* Harr., appeared upon cultivated White Spruces in two or three places in Manitoba. Mr. T. C. Court sent specimens from Petrel, Manitoba, and their work was noticed upon cultivated spruces around the government offices in Winnipeg as well as in the sand hills south of Douglas, Man. This insect occurs in troublesome numbers from time to time in Manitoba, but is easily controlled by poisonous sprays if promptly applied as soon as the larvæ are noticed. A very similar larva, but probably of another species of sawfly, was sent to me by Mr. H. H. Miller, M.P., from Hanover, Ont., where it had been found in destructive numbers upon a cedar (arbor-vitæ) hedge which was much valued by its owner.

THE SPRUCE GALL-LOUSE (*Chermes abietis,* L.).—An insect which is spreading widely through the Dominion and which of late years has been the cause of much anxiety among the growers of ornamental spruces and even of lumbermen, is the Spruce Gall-louse. This is the insect which causes the elongated green cone-like galls on the twigs of the native Black and White Spruces and of the imported Norway Spruce. These galls have been more than usually abundant during the summer of 1905, particularly upon young transplanted trees. Specimens have been sent in from many places.

Although undoubtedly the Spruce Gall-louse does injure trees to a serious extent when present in large numbers and also gives them a very unhealthy and unsightly appearance, still I do not know of any actual instances where it has killed trees outright.

About the end of July the galls begin to dry up, and the cavities at the base of the leaves open slightly and allow the young gall-lice, of which there are several in each cavity, to escape. These then crawl out and rest upon the leaves, and after a short time they moult and appear with wings. This is the time when the insect spreads from tree to tree; for these mature females fly to fresh trees or to fresh branches on the same tree and begin to lay small, pale yellow eggs, which are in clusters of from 20 to 50 together. From these eggs young plant-lice hatch, which remain on the twigs and at the base of shoot buds until the following spring. Many of these young lice, however, die before spring, and those which do survive the winter, may be found at the bases of the buds in May, enveloped in a coat of white waxy threads. These young plant-lice are very small when winter sets in; but in spring they grow rapidly, and, after moulting the old winter coat, they secrete another of much finer texture and much more conspicuous, of long woolly threads. When full grown these insects, which are all females, lay clusters of upwards of 300 eggs at the bases of the young shoots just about the time the spruces are beginning their new spring growth. The eggs are light yellow in colour, extremely small, about one-sixtieth of an inch in length, and each one is attached by a slender thread-like stem about twice the length of the egg. In about a week the very minute nymphs crawl out from beneath the woolly mass consisting of the dead body of their mother, and crawl on to the young shoots, where they take up their position at the bases of the leaves which have already begun to swell and form galls before their arrival, owing to the presence of their mothers during the winter. The green cone-like gall grows rapidly during June; the base of each leaf swelling and expanding so as to form a cavity which gradually develops and covers in some of the young insects. In time this cavity is closed all but a narrow semi-circular slit at the top. It is claimed by Prof. R. A. Cooley, who did very careful work on this insect while at the Massachusetts Agricultural College, that, in general, all of the nymphs which enter one gall, arise from the egg cluster laid by one female. As the gall grows in size, these cavities are enlarged, this leaves room for the increased growth of the insects which it contains.

As stated above, these insects do not become full grown and emerge from the galls until the end of July or during August. The remedies for the Spruce Gall-louse, unfortunately, cannot be applied when the insects occur on very large trees and in forests; but, upon hedges and in ornamental grounds good work has been done by spraying the trees at the time the young plant-lice are exposed on the trees, viz., in May, and after they emerge from the galls in August. Good results were secured by spraying with a tobacco and soap wash made by soaking ten pounds of tobacco leaves in 3 or 4 gallons of hot water for six hours, the liquid strained off and two pounds of whale-oil soap added. When the soap is all dissolved, the mixture can be diluted to 40 gallons. Two or three applications should be made at short intervals.

THE LARCH SAWFLY (*Nematus erichsonii,* Hartig).—About 20 years ago the Larch Sawfly was imported into America, probably with trees sent to the Harvard Arboretum and Botanic Garden at Cambridge, Massachusetts. From that point it seems to have

spread widely and very rapidly northward. In 1882 it reached Canada, and for three or four years after that did an enormous amount of injury by stripping the leaves from the tamaracks, or American larches. The attack was very severe, and, although from the injury being done comparatively early in the season, the trees were able to push forth a certain amount of foliage; after three or four years of being stripped, the larches over millions of acres, and practically over the whole of eastern Canada, were almost wiped out. With this large destruction of its food plant the insect practically disappeared, and little has been heard of it until last year, when it again became noticeable upon ornamental European larches and in a few places was observed on the young growth of larches in swamps. During the past summer there has been a marked increase in the numbers of the larvæ or false caterpillars. The injury is mentioned incidentally in correspondence from many points. Rev. Father Burke writes from Prince Edward Island:—'I am sorry to say the Larch worm is again appearing on the new growth, and I fear we may have it much more abundantly next year.' In the Nova Scotia Crop Report for November, 1905, a correspondent writing from Richmond county says:—'Insects have again been destroying juniper trees.' This is a reference to the Larch Sawfly. The American larch, known also extensively in this country under its Indian name of the *tamarack*, is called in the Maritime Provinces by the inaccurate name of 'juniper,' a name which is also curiously, and with equal inaccuracy, given in the upper Ottawa country to the Banksian or Jack Pine. In New Brunswick I saw evidences of the work of the Larch Sawfly at several places along the Intercolonial Railway and in Ontario for hundreds of miles along the Canadian Pacific Railway between Ottawa and Lake Superior. The larches at Nepigon, Ont., north of the lake, showed no injury, and I am under the impression that so far this new outbreak of the Larch Sawfly has not as yet reached west of Lake Superior. The tamarack swamps west of Nepigon were scanned carefully in passing along the railway, and a large swamp was examined more critically near Douglas, Manitoba, but no trace of the larvæ was seen. Specimens of the larvæ were sent from Burlington, Ont., by Mr. R. C. Cummins at the end of June.

A feature of the last outbreak of 1882 to 1885 was the rapidity with which the attack spread and the suddenness with which it disappeared. Occasional specimens of the sawfly or of the colonies of larvæ have been seen from time to time since 1885; but there has been no noticeable destruction until the present year. The territory over which this insect is known to have spread in the old outbreak, is all through Ontario, Quebec and the Maritime Provinces, right up to Labrador (*teste* Dr. Robert Bell and Mr. A. P. Low). We have no information relating to the vast tamarack swamps north of Saskatchewan and Alberta; but there is little doubt that this enemy spread through all districts where the American larch grew naturally, and that the depredations of this one insect resulted in an enormous loss to the Dominion in one of its valuable assets. Unfortunately, no remedy can be applied over the vast areas of forest where the insect is likely to occur, should it increase again; but upon ornamental grounds small groups of trees can be easily protected by the ordinary spraying methods. The best poison probably for this insect would be a spray of Arsenate of lead 1 lb. in 40 gallons of water.

THE LARCH CASE-BEARER (*Coleophora laricella,* Hbn.).—In the month of May last the young leaves of the European and other larch trees on the lawns and in the Botanic Garden of the Central Experimental Farm, were seen to present a bleached white appearance; and, upon examination, it was found that the upper ends of the leaves had been hollowed out and were shrivelled. It was then found that this work had been done by large numbers of the small European Elachistid moth *Coleophora laricella,* Hbn. Although this insect has been recorded as injurious to larches in America on a few previous occasions, this, I believe, is the first occurrence of the Larch Case-bearer in Canada. Dr. Howard has kindly referred me to the American literature of the subject and tells me that he himself saw the larvæ very abundant some years ago in a

larch plantation near North Andover, Mass. In 1886 Dr. H. A. Hagen published in the *Canadian Entomologist,* an article on its injuries to the European larch in Massachusetts. In 1892 Mr. J. G. Jack, as related in Insect Life, vol. IV., p. 105, states that the insect had been introduced into Massachusetts for a number of years, and that its ravages had sometimes been quite noticeable in the Arnold Arboretum. Mr. Jack wrote from Berlin in an article entitled 'Notes of a Summer Journey in Europe,' which appeared in *Garden and Forest* for February 24, 1892, p. 87, and says of this insect that 'the European larch is sometimes seriously injured and is often killed by the larvæ of this moth, which eat out all the interior of the leaves, leaving only the dry, hard, shrivelled epidermis.' He also points out that the Japanese larch, both in Germany and at the Arnold Arboretum, is not attacked by the insect.

The numbers of the larvæ upon the trees at Ottawa in May last were not large enough to have any serious effects upon either the growth or appearance of the trees; but I regret to find this autumn that the small cases of the larvæ are enormously more abundant than they were last spring. The winter cases are very slender and vary from $2\frac{1}{2}$ to 4 millimetres in length by about half a millimetre in diameter. They are open at the end and are almost cylindrical in shape, like a cut off leaf. For that reason they are easily overlooked. There were among these larval cases a very small percentage which were curved after the manner of the winter cases of the Cigar Case-bearer of the Apple; but it is possible that these may have been the cases of another species. The cases of the full-grown larvæ of the Larch Case-bearer are after the same pattern as the winter cases, but are thicker and resemble more nearly those of the Cigar Case-bearer by being tapered slightly to each end. They are very little longer than the winter cases but have a much larger diameter, being over one millimetre at the widest part; and the end is somewhat pinched in. The colour is pale drab. The caterpillars have a curious habit, when full grown, of fastening themselves in the centre of a fascicle of leaves, where they are very difficult to detect. There is only one brood in the year, the moths of which appear in June. They are very small, not expanding more than one third of an inch when the wings are opened, of an ashy satiny gray colour, with long, slender antennæ. After pairing, the females lay their tiny yellow eggs on the needles of the larch. These soon hatch, and the larvæ eat their way into the slender needles of the empty skins of which, subsequently, they make the slender cases in which they pass the winter, attached to the twigs of the trees. As soon as the buds begin to swell in spring, these minute caterpillars revive and feed upon the young leaves. When a caterpillar attacks a leaf, it eats a hole in the side, and, as it consumes the interior portion, it protrudes its body from the case until it can reach no further without leaving the case. In spring the young caterpillar grows rapidly, and its winter case soon becomes too small for it; so, it is split down the side, and the empty skin of another leaf is inserted. This operation is repeated from time to time when necessary, until full growth is reached. Some cases from successive additions have a ridged or striated appearance. Pupation takes place inside the case, and the moths emerge from the upper end. Up to the present time nothing in the shape of a practical remedy is recorded.

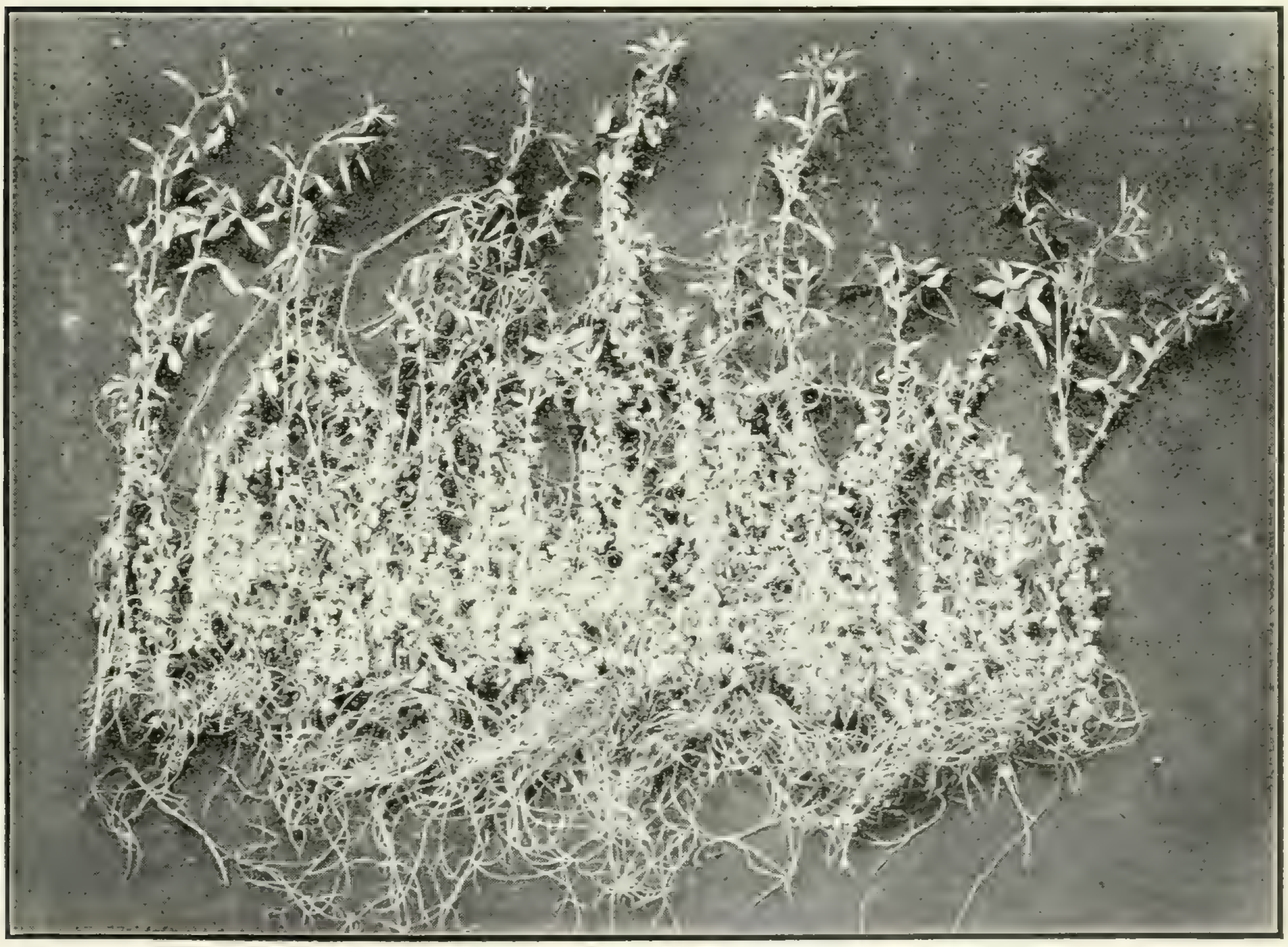
Through the kindness of Mr. A. Scheck, of the German Consulate, in Montreal, I have received the following interesting account of the habits of this insect, in Germany, from Mr. Rudolph Japing, Forest Assessor, Muenden, Hanover, Germany:

'The moths of *Coleophora laricella,* Hbn., fly during the day time in May and June. The females lay yellow eggs on the needles, which in 6-8 days turn to a grayish colour. Upon hatching the young caterpillar eats its way into a needle, consumes the interior, and from the empty skin makes a small bag in which it lives until September. During winter the caterpillar remains in this bag, generally on the top of the branches, more seldom in crevices of the bark. In spring it is again found mining in the new needles, and soon has to enlarge its bag, which it does by joining to it a part of a newly hollowed out needle. In this bag the insect changes to a chrysalis in April and May, the moth emerging at the end of May.



THE SPINED RUSTIC *(Barathra occidentata*, Grt.*)*

Moths (the lower, typical), and caterpillars, young, half grown and full grown.



CLOVER DODDER ON ALFALFA.

(Figure kindly lent by "Farmers' Advocate," London, Ont.)

'The injury to the trees from these insects can be very great, especially in spring. The growth stops and the trees become feeble and are thus susceptible to canker, which often follows the damage done by the insect. The Larch Case-bearer is mostly found on trees from 10 to 40 years old.

'In nature the insects are devoured by many birds, and in autumn they are often destroyed by protracted rains and by early frosts.

'Trees badly infested by these insects should be cut down from the middle of June till the end of August. This causes the leaves to dry up and the caterpillars die of starvation. It would be better to burn the needles, but this is possible only in nurseries. In the extensive forests of Canada it would be difficult to do anything effective to destroy the insects.'

The White-marked Tussock-moth (*Hemerocampa leucostigma,* S. & A.).—Of recent years the shade trees in several of our Canadian cities have been very much disfigured by the caterpillars of this well known native insect. Energetic measures have been taken by the local newspapers and the civic authorities, particularly in Toronto and Montreal, to reduce this quite unnecessary injury to the fine shade trees in these beautiful cities. Public meetings have been called, and the advice of specialists has been taken. There is nothing of any importance which is still unknown of the habits of this insect, and all that is now necessary is the prosecution of a vigorous campaign at once, so as to control as soon as possible, if not actually to wipe out, this unwelcome guest which has done so much harm. The subject was treated of at some length at a public lecture which I had the honour of delivering before Toronto University in February last, and again before the Toronto Horticultural Society in June. The discussions were reported at length with further comments by the Toronto *Globe* and other newspapers. A similar action was taken in the city of Montreal where a conference was summoned by the Montreal Natural History Society, and a thorough discussion of the subject took place. The *Montreal Star, La Presse,* and other newspapers, published several articles in their daily editions, and at request I prepared a full article for the *Weekly Star and Family Herald.* The course of action recommended by me at all of the above meetings was to destroy the caterpillars by spraying the trees while the caterpillars were young, with arsenites or other active poisons, and the collection of the conspicuous egg masses during winter. Prof. D. P. Penhallow, of McGill University, has taken an active and useful part in distributing information on the subject, and in drawing the attention of the public of Montreal to this important matter, and his efforts have been ably supplemented by Mr. H. H. Lyman, who has materially assisted with expert advice as to the correct natural history of the insect. It is to be hoped now that public attention has been drawn to this matter, vigorous measures will be adopted, and that private citizens will second the efforts of the municipal authorities by attending to their own trees and gardens, which cannot be well reached by officials. In this way this insect may be very much controlled. Its possibilities for injury are only too well known by what it has done in New York, Rochester, Cleveland and other cities in the United States.

The Vancouver Island Oak-looper (*Therina somniaria,* Hulst).—The beautiful oak trees which form such an attractive feature of Victoria, Vancouver Island, have again this year suffered severely from the attacks of the caterpillars of this geometrid moth. It was hoped from the large numbers of parasites which were reared from the pupæ last autumn, that the injury during 1905 would have been less than in the preceding season. These hopes, however, were doomed to disappointment, for the caterpillars occurred last spring in countless myriads and stripped every vestige of foliage from most of the oaks around the city and for several miles out into the country. Mr. J. R. Anderson wrote under date June 23:—

'*Therina somniaria* is already at its deadly work worse than ever. The oaks in some places are already stripped of their leaves, and other plants are being attacked

by the famished larvæ, which are as yet only half grown. What is to be done, I do not know, unless the parasites increase. Treatment of the trees with poisons over miles of country is of course out of the question.'

There is some doubt among entomologists as to the exact status of *T. somniaria* as a species. It has usually been considered that it is a form of *Therina fervidaria,* Hbn., but the difference in the food plant, *fervidaria* having been found in nature, here at Ottawa and in other places, feeding on conifers, seemed to indicate, more perhaps than the slight differences in markings on the mature insects, that the western form would probably prove to be a different species. Having received eggs from Mr. Anderson early in the spring, as soon as the young larvæ hatched, they were placed upon fresh twigs of the hemlock spruce (*Tsuga Canadensis*), and, although it cannot be said that at any time they fed upon the hemlock with avidity, nevertheless some specimens were carried through upon this food plant alone and gave moths at the usual time. Moreover, on Vancouver Island, when travelling with the Rev. G. W. Taylor, in September last, a few miles out of Victoria, we observed one instance where the larvæ, after having stripped the oak trees, had spread for a short distance into a grove of Western Hemlock Spruce and Douglas Fir, the leaves of which to some extent had been eaten by them. Mr. Taylor, who is a specialist upon the Geometridæ considers it more probable that *Therina* (Ellopia) *somniaria* of Hulst is a variety of *Therina fiscellaria* of Guenee, which is a segregate from the old composite species *Therina fervidaria* of Hubner, than that it is identical with the type species *T. fervidaria,* Hbn. He says:—'It may be said that *T. fiscellaria* and *T. somniaria* feed as larvæ on deciduous trees, while true *T. fervidaria* feeds on conifers.' It would appear from experiments which I have carried on at Ottawa, that this generalization is accurate, and, although eggs of *somniaria* from Vancouver Island gave larvæ which under compulsion fed on hemlock spruce, a conifer, others from the same batch of eggs ate oak, their natural food plant, much more readily. *T. fervidaria* at Ottawa feeds naturally on hemlock spruce.

From pupæ received from Mr. J. R. Anderson, which had been collected at Victoria, several specimens of *Pimpla scriptifrons*, Cress., were reared, thus adding one more species to the many parasites which are already known to prey upon this insect. I saw the mature moths and the parasites emerging in enormous numbers in Victoria on September 18 last. Trees, fences, and sides of houses were swarming with the pretty soft brown, large-winged moths.

THE APIARY.

The Apiary, as in the past, has been under the management of Mr. John Fixter, the farm foreman, whose report I append herewith. The same experiments which have been carried on for some years have most of them been repeated on account of the large amount of interest which has been evinced in the subject by correspondents and visitors to the Central Experimental Farm. The services of Mr. Fixter have been asked for at a great many meetings of bee-keepers, and, whenever his duties at the Central Experimental Farm would permit of it, he has attended these metings and given addresses.

REPORT OF MR. JOHN FIXTER.

Season of 1905.

The season of 1905 has been a fairly good one; especially in western Ontario the honey crop has been excellent, both as to quality and quantity; parts of Quebec report medium crops, while other sections report heavy crops. Correspondents from New Brunswick, Nova Scotia, Prince Edward Island, Manitoba, the North-west Territories,

also British Columbia, report medium to heavy crops and that bee-keeping is on the increase in each of those provinces.

The season opened very late in the Ottawa valley, there being so much cold wind at the end of March and up to April 11. It was necessary to keep the bees in their winter quarters until this latter date when the colonies were placed on their summer stands after being confined in their winter quarters for 139 days. The temperature, 52 degrees, and the weather bright and mild on April 11 were most favourable for the cleansing flight of the bees. Then followed many days of cool and windy weather, which kept the bees confined to their hives; this continued the greater part of April, the average temperature for April being 41·14. May set in warmer, the bees gathered pollen freely, and built up fairly well. During the long cold spell in April it was found necessary to feed the bees to keep up brood rearing and to prevent spring dwindling.

The number of colonies on November 23, 1904, was 50, all of which came safely through the winter. Of these two were sent to the Experimental Farm at Nappan, N.S. Eight colonies being rather weak were doubled with others, leaving 40 strong colonies to begin the season of 1905. These were again increased by swarming to 50 colonies, when the hives were put into their winter quarters on November 7, 1905. They all weighed then over 50 pounds each. The honey crop at the Experimental Farm Apiary has been a fairly good one, the average yield being 73 pounds per colony, spring count.

EXPERIMENTS ON HOW TO PREVENT SWARMING.

I.—*H. G. Sibbald's Plan.*—For this test six colonies of bees in eight-framed Langstroth hives were selected weighing on an average 48½ pounds each. All were examined from time to time for swarming. On June 10 there was no sign of swarming. At that date each colony had abundance of brood and a considerable amount of new honey. On June 15 they were again examined. Three colonies were found preparing to swarm. Those three colonies were set off their old stands on other stands a little to one side. New hives were placed on the old stands thus left vacant. Each one of these contained two empty combs and five empty frames with two inch starters of foundations. Next, one frame of brood with queen-cells on it, was taken from each one of the old colonies that had been set to one side, making sure that we did not get the queen, and placed with the adhering bees in the hive between the two empty combs. The extracting super that had previously been removed from the old colony, was placed on the new hives with all the bees it contained. On June 19 a second examination was made. One more colony was preparing to swarm; this one was treated the same as the former three. The old colonies that had been manipulated, were examined, and all queen-cells were found to be destroyed. The old colonies were then placed on their original stands, removing the one frame of brood from the new hive, destroying all queen-cells on it and placing it in the old colony. Any bees that remained on the starters were transferred to the old colony. The extracting super that was taken off the new hive was again placed on the old colony along with the bees it contained, making one very strong colony. The fourth colony that was found preparing to swarm, was treated after four days in the same manner as the three former colonies. The other two colonies did not swarm during the season. At the close of the season we had six very strong colonies, with plenty of stores for winter and 468 pounds of extracted honey.

II.—*Forced or Shaken Swarms.*—For this test six colonies of bees in 8-framed Langstroth hives were selected, weighing 49¾ pounds each. Examined on June 10 they showed no sign of swarming; there was abundance of brood and considerable new honey. June 15 a second examination was made; four colonies were preparing to swarm. The two remaining colonies did not swarm during the season.

Six other hives are previously prepared for swarms, each containing, in the order named from left to right: four dummies, one starter, one worker comb and two starters. One of these hives is brought and set on a stand directly behind one of the hives to be treated. The operator removes the first two dummies (Nos. 1 and 2) from the left or nearer side of the new hive, and puts them on one side. He then lifts from the brood chamber of the old hive the comb nearest to him, shakes it almost free of bees, and places it in the new hive next the left wall. The next comb in the old hive has a double space for shaking off. After being shaken it is placed beside the first, and the return motion of the hand carries the dummy (No. 3) from the new hive to the old one. Comb No. 3 is shaken, carried to the new hive, and dummy No. 4 is brought back. The fourth comb changes place with the first starter, and so on. When the eighth comb has been shaken in its own hive and transferred to the new, the brood chamber of the old hive is filled up with the remaining two dummies, Nos. 1 and 2. We then put supers on again, close the hive and the bees have been swarmed.

On the seventh day after shaking, the four old colonies were removed to another location. Most of the bees that were flying went with the shaken swarm, leaving the old colony so weak that it did not have any inclination to swarm, and only made sufficient honey to carry it over winter.

At the close of the season we had from this test 10 colonies and 432 pounds of extracted honey.

EXPERIMENTS IN IMPROVING STOCKS OF BEES.

Every farmer knows that there are great differences in his cows, hens, &c., but there is too often an idea that all bees are alike, and that bee-keeping is all a matter of luck. If you observe closely, you will find that one colony of bees may give you good returns, while another just beside it, does nothing in the surplus chamber. Bees are by no means all alike. They differ in disposition, temper, industry, and in other ways. It is worth while for you to have the best. Fortunately the change from poor to good stock may be made more rapidly than with other stock, and at less expense. By paying out a dollar or two for a queen, you may change a colony of poorest black bees to Italians. All you need to do is to send off your order to a reliable queen-breeder, such as advertise in our bee journals and agricultural papers, and the queen will come by mail, with directions for introducing it, which are easily followed. As a worker bee only lives about six weeks in the honey season, and, as the new queen will be laying from one to three thousand eggs in a day, you will see that, if you get an Italian queen into a colony, it will not be a great while until all the bees in the hive are Italian. Even if you do not change from one kind of bees to another, it is generally a matter of advantage to introduce fresh blood occasionally. In any case, whether you get fresh stock from outside or not, whether your bees are Italians or hybrids, there is always something to be done in the way of improving your stock, so long as any one of your colonies is better than the others.

How are you to know which are your best colonies? By keeping track of their performance, and putting it down in black and white. You can keep account of the amount of surplus honey you take from each colony, and set it down at the time. The next year you can select the best colony for your queen-breeder, and a certain number of the next best colonies for drone rearing. One thing, however, must be taken into consideration, and that is, whether there has been no change of queens in any of these colonies. The colony that gave you the largest amount of surplus last year, may have got a new queen last fall or this spring; the young queen may also have met a drone of poor stock, and from this you do not wish to breed. You can, therefore, count only on those colonies that have made a good record and still have the same queen with which they began the season last year. You must also take into account any special advantages or disadvantages. For instance, if from colony No. 1 you took two frames of brood in the spring to give to No. 2, and you then found that No. 2 stored just a

little more surplus than No. 1, it would not be fair to rate No. 2 as better than No. 1. The matter of swarming also comes in. A colony that has cast no swarm throughout the season, will be expected to store more surplus than either the swarm or the mother colony, generally it will store more than both together. Nearly always, however, it will be found that the bees that do the most work, are the least given to swarming; so, the swarming of a colony counts against it in making out its character.

In the ordinary course of management, where bees are left to their own way, and all the increase is through natural swarming, there will, of course, be the most increase from the colonies most given to swarming, which means that the general character of the Apiary will run toward swarming rather than storing. We want, however, to have the tendency not to swarm. There is a way in which a good deal can be done in the way of improvement, even by those most skilled in the management of bees.

Having decided which one, or two, or three, are the best colonies you have, watch for the first one that swarms. Suppose Nos. 1, 2 and 3 are your best, that No. 4 is the next strongest, and the rest follow in the order of their strength, 5, 6, &c. Suppose No. 2 swarms; hive the swarm and put it on the stand of No. 2. At the same time, put the old No. 2 in place of No. 4, and put No. 4 in a new place. All the field bees that were in No. 2 will join the swarm, making it good for work. The old No. 2 (now No. 4) will thus be deprived of its field bees, but on the other hand it will get all the field bees that belonged to old No. 4. In about eight days No. 2 will have a young queen matured, and will send out a swarm. You will now proceed much as you did before. Hive the swarm and put it in the place of No. 2, and put No. 2 in place of No. 5, putting No. 5 in a new place. The field bees of old No. 5 will strengthen No. 2, now on No. 5 stand, and in a day or two it will send out another swarm. Proceed as before, putting No. 2 in place of No. 6, and so on as long as swarms issue. In this way you have, perhaps, no swarms from old Nos. 4, 5, &c., but in their place you have swarms from No. 2, all of them having queens of your best stock. When No. 1 swarms, or No. 3, you can treat them the same way.

There is, of course, the possibility that No. 1 or 2 may not be among the first to swarm. Take frames of sealed brood from colonies that you do not want to swarm, and give them to one of your best colonies, while delaying the swarming of those from which the brood was taken. Of course, when you take these frames of sealed brood, you will merely exchange them for frames that have little or no sealed brood in them.

QUEEN REARING.

Rearing queens has become a regular trade, and some bee-keepers make a business of shipping queens by mail to those who wish to purchase. Although it may not be desirable for the farmer with only a few colonies to go into the subject fully, he should know enough about it to rear the queens at times, for his own accommodation.

When a colony prepares for swarming, a number of queen-cells are started, six, eight, ten, possibly many more. As soon as the first one of these is sealed, the colony is likely to throw off a prime swarm. Six or seven days after this swarm has issued, the mother colony may divide up into two or more parts, each part being called a nucleus, the word 'nucleus' merely meaning a very small colony. You will generally have enough queen-cells in each nucleus without any attention on your part, but not always. Sometimes you will find a large number of queen cells on one comb, and some combs without any. So, it might happen that if you give the matter no attention you might have a nucleus without any queen cell.

Another thing must be considered. A large proportion of the queen cells are built on the lower or outer edges of the combs. If these were left in the old colony without dividing, they might be all right; but when these combs are used as nuclei,

it is harder for the smaller number of bees to keep them warm, and when a cool night comes, the bees will shrink away from the edges of the combs, and the queen cells will be chilled. Hence, you must see that each nucleus has at least two or three good queen cells where they will be sure to be inside of the cluster of bees in the coolest nights. So you will cut away cells from the edges of the combs and from combs that have them to spare, and fasten them where required. To cut out the cells, you may use a pocket knife with a very sharp, thin blade that is more than an inch long. You need not cut away more than enough to get all the cell; but be very careful not to cut into the cell; also not to let one of the cells fall, for while the young and tender queen is in the cell, a fall may cause a defective wing or leg.

To fasten a queen-cell where you want it, use a very slender wire nail an inch and a half long. Push the nail through the base of the cell, but be sure it does not enter the cavity of the cell. Nail the cell right over some of the brood, for it will be more surely taken care of there than if separate from the brood.

It may be noticed that the bees build queen-cells with the points hanging downward, but it is not important that you should have them in exactly the same position. A still better plan than a nail to fasten a cell, is a staple, the staple being an inch and a half wide with points one inch long. Lay the cell against the comb, put the staple over it so that the cell is at one side of the staple, and then sink into the comb the staple point that is farthest from the cell. Possibly you may be inclined to think that because only one queen is to be reared in a nucleus, there is no need to have more than one queen-cell. That would be a mistake. While most of the cells reared by a colony preparing to swarm may be of the very best that colony can rear, it is not safe to assume that all are equally good. Some cells may contain poor queens, and some cells may contain nothing but a dead larva. So it is wise to have a number of cells in a nucleus, at least two or three. The bees will be likely to use the best. You will be able to see a difference in the appearance of the cells, and while you are dividing the cells among the nuclei, you may as well see that each nucleus has its fair share of the best-looking cells. The best cells are generally among the largest and longest, and are deeply pitted over the surface. A stubby cell that is not pitted but has a smooth surface, is not likely to be good. When the young queen is five to eight days old, she will fly out on her wedding trip, and about three days later she will begin laying. It may be well not to look for eggs till the queen is perhaps two weeks old, for at first the eggs are few, and not easily found. If you do not find eggs when the queen is two weeks old, you are not likely to find any later—the queen has been lost on her wedding trip or there is some other trouble. It is a good plan to give a nucleus a frame of eggs or unsealed brood from a choice colony when the young queen is four or five days old. If some ill has befallen the queen on her wedding trip, or if she has entered the wrong hive, the bees will start queen-cells from this young brood. This young brood seems also to have a sort of stimulating effect on the bees, and it is believed it may hurry up the young queen in her work of laying.

CARE OF EMPTY COMBS.—REMEDY FOR BEE MOTH.

Almost any bee-keeper will have honey-combs that are for a time unoccupied by bees; even if through no other cause, colonies may have died in winter, leaving combs empty or containing honey or pollen. Such combs are valuable property and will repay the care required to preserve them. The three principal enemies of unoccupied combs are mould, mice and moths.

Combs kept in a damp, close cellar are likely to be affected by mould. This cannot be entirely prevented where bees are wintered in the cellar; for, even if no colonies die, it may happen that some of the outer combs unoccupied by bees will be covered with mould. Fortunately, the remedy is not difficult. Put a mouldy comb next the brood-nest of a prosperous colony in the working season, and you will be surprised to

find how soon the bees will clean it up so that you will hardly recognize it as the same comb.

Mice must be kept away from combs by shutting these up in hives or in such other place where the mice cannot enter. But be careful that you do not pen the mice in with the combs.

The chief enemy of the apiarist is the Wax Moth. If a colony dies in the spring and the hive remains unnoticed on its summer stand, it is almost certain that, before the summer is over, you will find it containing a solid mass of webs and cocoons, with perhaps not a vestige of comb left. You may have sealed up the hive moth-tight before it is warm enough for a moth to fly; the result will be the same; for the eggs of the moth by some means have been laid, during the previous fall, in the hive, notwithstanding the presence of the bees. It is, however, not an easy thing to make a hive moth-tight, for a moth will squeeze through a much smaller crack than a bee. The right thing to do with a hive full of combs upon which a colony has died, is to get the combs as soon as possible in the care of a strong colony of bees. Especially if of Italian blood, the bees will make short work of cleaning out the worms before they are large enough to do much harm.

There will be little danger to the combs from the moth until the weather has become warm and bees have been flying for some time, say about the time of apple bloom. When a hive is noticed with unoccupied combs, clean out all dead bees, and put it under a hive occupied by a strong colony. If there should be any entrance directly from outside into the upper hive, close it up, so as to oblige the bees to pass through the lower hive in going in and out. Keep the entrance very small the first few days, for fear of robbers. After the colony has had this lower hive in charge for about a week, so as to get it cleaned out and get used to the work, you can give it a second hive of combs to clean out, putting the second in the place of the first.

If colonies have died in hives in the cellar, there will not be the same need of haste as to getting them in care of the bees. Indeed, it may not be a bad plan to take into the cellar hives whose bees have died on the summer stand; for in the cellar the worms will hardly get a fair start until the next spring, when the unoccupied combs will be needed to form swarms. It is well, however, to look at them occasionally to see that they are all right, for it is not difficult to see where the worms have run their silken galleries. The question is often asked whether it will do to hive a swarm in a hive in which a colony has died. Unless such a hive is exceedingly filthy, the bees will promptly clean it up, at the same time being saved much labour in building new combs.

It is well to know that freezing destroys the worms. So a hive of combs that has been left out all winter, is in no danger of worms until well along in warm weather, when moths have had time to mature and to lay eggs. If such combs are hung up in an airy place with a space of an inch between them, they will almost surely be safe from worms throughout the summer, and indeed worms may not trouble them all summer if left in the hive in their usual position.

If for any reason it is desired to kill worms in combs, sulphur is the material usually resorted to. A very little of the fumes of burning sulphur will finish the worms when they are quite small; but, when full grown, it takes a very heavy dose; so it is well first to pick out the larger ones by hand. For this take a sharp pointed knife and pick open the comb at one end of the silken gallery for half an inch, then commence at the other end and tear it open the whole length. This will drive the worm along till it comes out of the hole you first made. You can end its existence by what means may seem best. To fumigate a hive with sulphur, set into a pan or kettle partly full of ashes a smaller vessel of *iron*. In this put the sulphur and throw on it a shovelful of live coals or a red hot iron. This must be in an empty hive or some tightly closed box or chamber so that the fumes cannot escape. Great care must be exercised so that the fire does not extend to the surrounding wood. The combs placed over the burning sulphur may be prevented from catching fire by means of a

piece of old sheet-iron placed under them. It must be further remembered that burning sulphur destroys only the worms, not the eggs. So, it may be necessary to treat the combs a week or two later, when any eggs laid will have hatched. Combs of honey for table use are not likely to be infested with worms; but in the case of black bees, especially if the combs are left too long in the hives, there might be some worms. The dose of sulphur for these may be lighter than for brood combs; if the dose is too heavy, the white combs will assume a greenish colour, which, however, does not hurt them for eating.

When extracting combs are extracted for the last time in the season, it is the practice of most bee-keepers to allow the bees to lick them dry. A hive full of such combs may be placed over a colony, a propolis quilt with a small opening through it, having first been placed over the brood frames, and this allowing but one or two bees to pass at one time. Thus, the bees are not so apt to break down the combs and there is less danger of robbing; but a surer way is to set the hive at some distance from the apiary and let the bees have free play at it. After being thoroughly cleaned, all hives containing combs should be removed to a dark room until late in the autumn, and then to a building where they will get the full benefit of frost during the winter.

UNFINISHED SECTIONS.

At the close of the honey harvest there will always be more or less of the sections unfinished, the number varying greatly in different years. It will happen some years when the season is poor, that none will be finished. Even in the best of years there will be a considerable portion left unfinished, varying all the way from those the bees have not started at all, up to those that are filled with honey, but have a few cells unsealed. Those that have not been worked at by the bees, having no honey at all in them, may be put away until the next year, when they can be used. Be very careful, however, that you do not make the mistake of leaving such sections too long on the hives. When the harvest is over, they should come off at once, for the bees will only daub bee-glue upon them, and sometimes to such an extent that the sections will not be accepted by the bees the following year. Some make a practice of taking off all sections at the close of the clover and linden harvest, so as to have none of the dark honey in them and to avoid the bee-glue being put on them while the bees have nothing to do between the early and late harvests. If a fall flow comes, sections can be again put on, or, better, extracting combs.

Sections that are not entirely finished, will, of course, do for the table, and if they are to be sold, they must be sold at a lower price. Any that are less than half filled with honey, should be fed to the bees. If you set out a super of such sections where the bees can get at them, they would promptly carry out the honey, but would be so eager at this work that they would tear down the tender comb so as to ruin it. Extracting combs are not in the same danger unless they are new. To avoid having the sections ruined for future use, cover them up so as to leave a passage for only one bee at a time to get at them. It is better to set them 10 or 12 rods away from the apiary.

These sections, after being cleaned out by the bees will be valuable for use the next year, and one or more of them, if put in each super that is first placed on the hives, will start the bees promptly at work. If the sections were not cleaned out, the particles of honey remaining would candy and affect the new honey put in them the next season.

JOHN FIXTER.

SESSIONAL PAPER No. 16

DIVISION OF BOTANY.

CLOVER OR ALFALFA DODDER.

From time to time inquiries are made by farmers concerning curious leafless, thread-like, fleshy parasitic plants which they find climbing over clover and alfalfa in their fields. The latter plant is also known as lucern. The parasite injures the host plants very much. As a rule only a few patches will be found in a field; but occasionally, as in an instance referred to below, the dodder parasite increased to such an extent that the crop of alfalfa was practically ruined. Specimens of the parasites having been procured through the kindness of Mr. H. H. Miller, of Guelph, Ont., upon examination they proved to be the Clover Dodder, which in this country is more generally known under the name of Alfalfa Dodder. Formerly this species was known as *Cuscuta trifolii,* Bab., from the frequency with which it occurred upon clover (*Trifolium*) in Europe, but it seems to be now generally conceded that it is the same species as was described from plants growing parasitically upon the wild thyme, and for which reason it had been named *Cuscuta epithymum.* There are several kinds of dodders growing in North America; but in Canada it is a small genus consisting of only a few species. Of these there are only one or two which cause injury to crops; and by far the larger number of cases reported are by the Clover or Alfalfa Dodder; this is a European species which has doubtless been brought into this country with the seeds of alfalfa or clover. It does not confine itself to the different kinds of clover, or even to plants of that natural order, but has been found upon a great many different kinds of plants. It is an annual coming up from the seed every year, and in the past the injuries from this parasite have been so small that it would appear as if in many seasons the seed did not ripen sufficiently to allow the plant to increase and become very destructive. It must be remembered, however, that very little alfalfa, which is a long-lived perennial, has up to the present time been grown in Canada, and consequently the only chance which the dodder had to establish itself, was upon Red Clover, which is a much shorter-lived plant and, as a rule, at any rate, is ploughed down after the second year's crop has been taken.

The seeds of dodder would hardly be ripe before the first crop of clover was cut, and its only chance for ripening seed and perpetuating itself would be in those pods which formed low enough to be left on the stubble, or such as were ripe before the second crop of clover was cut in the autumn. The fleshy pods seem to take a long time to ripen; and among those I have examined, there were very few which seemed dry enough to withstand the September frosts without injury. This, however, is only conjecture, and doubtless in some places further west than Ottawa seed may have ripened this year as it has in previous years to some extent. That this is the case, is shown by the persistence of the plant for two or even three years in a field after it had first been observed. However, such plants may come from seed sown with the clover, of which the germination was delayed; for Mr. H. H. Miller, in a good article upon this subject which was published in the *Farmer's Advocate* for Nov. 23 last, states that 'the seeds will retain their vitality in the soil for five years or longer under favourable conditions. Tests as to vitality have shown that the half-ripe seed of this species will retain sufficient vitality to germinate almost as readily as the fully ripe seed. In some cases, they germinate more quickly; and, when the seeds have been found in their capsules, the percentage of germination was but little inferior to that of well ripened seed.'

The injury done to clover and alfalfa by the dodder is by actually sucking their elaborated sap from them. When the young seed first germinates, a slender yellow thread is pushed up from the soil, which swings round slowly as it grows, and, as soon as this thread touches a living plant, it twines itself around it and throws out from the surface which touches its host, many rootlets or suckers which grow into the tissues of the host plant and draw from it its sap. The host soon becomes dwarfed and in time dies. The dodder plant, however, in the meantime has thrown out a very much branched tangle of fine stems which have spread to other plants in the neighbourhood, from which it is also drawing its nutriment. As soon as the young dodder plant has attached itself to a suitable host, its connection with the soil dries up and ceases. The flowers of the dodder are not produced until the plant has attained a considerable size, when it may form a thick mat from two to four feet across. The flowers are borne in thick conglomerate clusters along the stems and are sometimes so abundant that they almost hide the yellow or reddish stems. Although the plant belongs to the Convolvulus family, the tiny five-lobed corolla does not very much resemble the well known shape of the flowers of the Morning Glory. The seed pod, however, and the shape of the contained seeds show the relationship. The separate seeds found in clover seed are variable in size, some being about the same size as Red Clover seed, others much smaller. They are obtusely triangular, of a pale greenish or yellowish brown colour, with the surface finely granulated.

It is probable that the large seeds, nearly as large as those of clover are of a different species from those usually found, which I take to be *Cuscuta epithymum*. Mr. G. H. Clark, Seed Commissioner of the Department of Agriculture, tells me that 'owing to the shortage in the clover seed crop of last year some of our seed merchants imported a lot of clover seed which had originally come from Chili, but was procured through European merchants. This seed was badly infested with Clover Dodder and Wild Carrot. The supply of lucern seed sold in Canada usually comes from Utah, and generally contains some dodder seed. If properly cleaned, however, lucern can be made practically free from dodder seed.'

Mr. Clark also writes me as follows: 'Since discussing the matter of the identity of the different-sized dodder seeds found in clover and alfalfa seed, I have gone more carefully into it and now believe that this recently introduced large dodder seed is *Cuscuta racemosa,* Mart., var. *chiliana,* Eng., of which you will note considerable reference made in the reports of French, German and Swiss botanists as a species of dodder found in clover seed imported from South America. We have been able to secure a specimen of seed that was grown by Dr. Stebler, of Zurich, which he classifies as *racemosa,* and which we believe to be almost identical with the dodder imported into Ontario during the past season. We have yet to learn whether this dodder will stand our Canadian winters, but it seems that *C. epilhymum* may become a nuisance in the south-western part of the province of Ontario.'

The following is cited from Mr. Miller's article in the *Farmer's Advocate* and refers probably to the worst occurrence of the Alfalfa Dodder which has ever been noted in Canada:

'As a good example of the injury this weed may accomplish when it once becomes established, let me mention a case in St. Mary's, Ont., where a fifteen acre field of alfalfa was in two years practically destroyed by this weed. The writer had the opportunity of visiting this field several times during the past summer, and through the courtesy of the owner secured the following information: The field was seeded down in 1902 with alfalfa, oats being used as a nurse crop. Conditions being favourable, it gave a beautiful stand in 1903, being cut twice and giving a total yield of about six tons per acre. The first indication of dodder was noticed June 1, 1903, when the owner found about a dozen small round yellowish patches, which he attributed to the bursting of drainage tiles. In about two weeks, however, these had spread so as to attract special attention, and, upon examination, he found masses of tendrils. In 1904 it had spread so as to produce a blight throughout the field. The alfalfa was

cut once and gave a yield of one and a half tons per acre. In 1905 six acres were cut and gave a yield of about one ton of dodder stems and alfalfa per acre. The remainder of the field was not considered worth harvesting, as the dodder had taken entire possession of the crop.'

The question has been raised as to whether alfalfa badly infested with dodder is fit for food for various kinds of stock. Hearing that Mr. T. Murray Bell, of Otterburn Farm, St. Mary's, had some dodder on his alfalfa, which he had fed to sheep, I asked him to let me know the particulars, which are given in the following letter:—

'St. Mary's, Aug. 13.—I have your favour of the 8th, and as requested I send you three samples of alfalfa with and without the parasite. You ask if this crop is grown for seed here, or merely for hay. In reply, as far as I know, it is merely grown for hay and is cut twice in the season. Yes, we fed our parasitized clover to our breeding ewes all last winter without any evil results, two-thirds of them having twins and an abundance of milk with little or no other feed. We intend doing the same thing this winter. The above mentioned hay was fully mixed with dodder when housed; and, when all was fed up this spring, there was no dodder to be seen anywhere. I believe that, if a field infested with dodder were depastured with sheep after the hay was taken off, little or no dodder would be left afterwards, provided of course that it had not already seeded itself.'

In August last I had an opportunity of discussing with Mr. Miller the occurrences of dodder at St. Mary's, and he obtained for me some heavily infested samples of alfalfa, and also, from the same field and grown on the same soil and under similar conditions, a sample of normal alfalfa which had not been attacked by dodder. These were submitted to Mr. F. T. Shutt, the Chief Chemist of the Dominion Experimental Farms, who has kindly furnished me with the following report, from which it will be seen that, as far as the chemical food constituents are concerned, the dodder-infested hay is of about equal value with the unattacked hay; but it must not be forgotten that the crop per acre is very much less, and above all, that the plants in an infested field are destroyed. This analysis is of value in showing that, when hay is found to be infested, there is no need to follow the general course and burn it, unless it is only occurring in very small patches through a crop.

ALFALFA AFFECTED WITH DODDER.

We received from Mr. H. H. Miller, O.A.C., Guelph, on August 16, three samples of alfalfa, as follows.—No. 1 free from dodder, No. 2 slightly affected with dodder and No. 3 very badly damaged, indeed, practically destroyed, with dodder. All the samples were in good condition.

At the suggestion of Dr. Fletcher, the Botanist, we submitted to analysis Nos. 1 and 3, with the object of ascertaining how far the feeding value of the alfalfa, as revealed by chemical analysis, might be affected by this parasite. In the following table the composition of the alfalfa is given, the results being presented as calculated both on the fresh and water-free material:—

Analysis.

	No. 1. Unattacked.	No. 3. Very seriously affected.
Fresh material—		
Moisture	73·41	72·24
Protein	4·91	4·77
Fat or oil	·67	·95
Carbo-hydrates	10·76	13·15
Fibre	7·84	6·81
Ash	2·41	2·08
	100·00	100·00

Water-free material—	No. 1. Unattacked.	No. 3. Very seriously affected.
Protein	18·49	17·19
Fat or oil	2·51	3·41
Carbo-hydrates	40·35	47·35
Fibre	29·50	24·55
Ash	9·15	7·50
	100·00	100·00

Presuming that the stage of growth of the alfalfa is practically the same in both cases, a comparison of the data should enable us to learn what effect or influence, if any, the dodder has had upon the host plant—alfalfa.

In respect to the most important nutrient, protein, the unattacked alfalfa is somewhat the richer; but the difference is by no means a marked one. The fat, or rather ether extract, includes a certain amount of chlorophyll, so that the slightly higher percentage in the affected alfalfa can scarcely be construed as indicating any superiority. The percentages of fibre and ash are slightly lower in the dodder-affected alfalfa.

It might scarcely be warrantable to draw any conclusion from so few data as to the physiological effect of the dodder; but I think we may safely infer that no great difference in feeding value exists between the dodder-free and dodder-affected alfalfa.

FRANK T. SHUTT,
Chemist, Dom. Exp. Farms.

Eradication.—The chief safeguard against dodder injuring a crop of clover or alfalfa, is to examine carefully all seed purchased and clean out thoroughly all weed seeds before sowing. The dodder seed, when once known, can easily be recognized by its dull surface and triangular shape. When dodder plants are found to be growing in a field the patches should be cut at once and the ground hoed so that no low-growing plants may ripen seed. Burning small areas by putting straw or coal oil over them is said to be effective, but would be less convenient than hoeing out the infested plants. Where a whole field has been thoroughly infested, it should be put under a short rotation in which clover for hay is omitted for at least two rotations, as it is claimed that the seeds will remain in the soil for five years without decaying; therefore, some of the seeds of the original sowing, particularly if these were rather dry, might be delayed in germinating for that time. As stated above, it is only quite recently that dodder has occurred in Canada in sufficient quantity in crops to do extensive harm; but, with the increasing cultivation of alfalfa, it is of course possible that it may become a more frequent enemy of farmers. It is therefore important that its habits and appearance should be known as soon as possible.

REPORT OF THE CEREALIST.

CHAS. E. SAUNDERS, B.A., Ph. D.

DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the third annual report of the Cereal Division.

The various problems in connection with the growing of wheat in this and other parts of Canada have occupied the greater part of my time during the past year. Attention has also been given to the other cereals as well as to the fodder crops included in the scope of this Division.

The winter months were occupied chiefly in the selecting of grain and in making milling and baking tests of important varieties and commercial mixtures of wheat. With the co-operation of the Chemical Division, a careful and thorough study was made of the milling and chemical value of the different grades of wheat in the Manitoba Inspection Division, using the crop of the previous year (1904). The results of this investigation were published in the form of a bulletin (No. 50) last June.

In February I attended the annual meeting of the American Breeder's Association, held at Champaign, Illinois, and presented a paper on 'A Natural Hybrid in Wheat.'

After the close of this meeting I visited wheat-testing laboratories in Chicago and Minneapolis, and spent part of a day at the Minnesota State Agricultural Experiment Station at St. Anthony Park. From this point I travelled to Brandon to attend the sessions of the Manitoba Grain Growers' Association. At this meeting I gave an address on the breeding and testing of wheats as carried on at the Experimental Farms.

The work of cross-fertilising in cereals was continued this year as usual, although the number of crosses made was not very large, owing to the fact that the work of previous years has given rise to such quantities of material as it is almost impossible to manage.

The study of these new types, and the selection from them of the most desirable sorts for propagation occupied much time during the summer.

Attention was also given to the second of the new races of hardy apples which are being produced at this Farm. Six crosses were made between hybrids of the first race and some of the standard apples, 121 seeds being obtained.

As soon as the cereal harvest was over I made a journey westward, visiting some of the more important wheat growing districts of Manitoba and Saskatchewan, for the purpose of studying the variations produced in wheat by differences in soil and climate, and to see to what extent the Red Fife wheat is mixed with other sorts. Many interesting observations were made, and important specimens collected on this trip.

I acknowledge with pleasure the valuable assistance rendered to me by Mr. George Fixter, foreman in charge of the field work of this Division, and by Miss M. Hager, who has aided me in the diverse kinds of work carried on in the office.

For samples of seed grain I am indebted to Prof. C. A. Zavitz, of Guelph, who sent to me Mandscheuri barley and Early Ripe oats, to Prof. Ten Eyck, of the Kansas Experiment Station, and Prof. M. A. Carleton, of the Department of Agriculture at

Washington, from both of whom were received samples of Turkey Red winter wheat, to Mr. A. Kirsche of Pfiffelbach-Apolda, for new varieties of cereals and to Mr. Wm. Farrer, of Lambrigg, N.S.W., for samples of some new Australian wheats of his own breeding.

I have the honour to be, sir,

Your obedient servant,

CHARLES E. SAUNDERS,

Cerealist.

CROSSING AND SELECTION OF CEREALS.

Increased care is being exercised every year in the selection of seed for the small groups of plants grown for breeding purposes. The improved, selected strains now being grown at this Farm furnish excellent material for this work of originating new sorts.

As the number of cross-bred kinds now on hand is so large, only a few new crosses were made this year. The conditions, as to weather, were quite favourable, and good results were obtained. In barley one cross was made, giving 14 seeds, and in wheat seven crosses, giving 80 seeds. The number of wheat flowers operated on was 104, the percentage of success being therefore nearly 77. Judging by the experience of former years this should represent nearly 75 per cent of true cross-bred kernels. It seems impossible to avoid entirely the production of self-fertilised grains.

The work of cross-fertilising was begun on June 27th and finished on July 8th. The cross-bred seeds obtained in 1904 were sown about a foot apart each way. Most of the seeds germinated. The plants made vigorous growth and matured large quantities of seed in nearly all cases. About 90 plants were harvested, among the most interesting being some beardless types of two-row barley, and some strong, early kinds of wheat produced by crossing Aurora with Red Fife and Riga with Pringle's Champlain.

The grain obtained from the mother plants raised from the cross-bred seeds of 1903 was sown in groups, the seed from each mother plant being carefully kept separate. As every seedling in each group can fairly be regarded as a distinct variety there were in this plantation approximately 40,000 varieties of wheat, 4,000 of oats, 5,000 of barley and 1,000 of peas, a total of about 50,000 new varieties. The great majority of these were rejected before or during the harvest, but several thousand of the more promising plants were retained for more thorough examination during the winter.

In addition to these unfixed sorts there were sown about 100 other new varieties or new selections, chiefly of wheat, in small plots. These are now quite fixed in type and they presented a most striking and beautiful appearance as they ripened. A few sorts were rejected for weakness of straw or for other reasons, and the remainder will be subjected to further careful study before being tested in the larger plots. The heavy storms which occurred during the ripening season made the observations on strength of straw particularly valuable. Among the most interesting new varieties and strains in this collection may be mentioned several selections from Red Fife, which are of the highest gluten strength and some of which ripen somewhat earlier than ordinary Red Fife. There are also some superior strains of Preston, Stanley, Percy, Huron, Riga and other cross-bred sorts produced in the first few years after the establishment of the experimental farms, as well as strains of other varieties which have not yet been described. Some crosses between Colorado wheat and Common Emmer and between Red Fife wheat and wheats of the durum or macaroni class are showing desirable qualities and may prove useful for those farmers who raise wheat for chickens. One of these new sorts (known for the present under the record number of

8 C) was subjected to a partial analysis by the chemist of the experimental farms and showed the remarkably high protein content of 17½ per cent. Another variety (9 J 3) showed more than 17 per cent of protein.

Among the new sorts of wheat recently obtained from other countries the variety called 'Bobs,' which is of high quality, was watched with special interest this season. A few seeds of this wheat were sent to this farm by the originator, Mr. Wm. Farrer, of New South Wales, who states that in the warmer districts of that colony it shows considerable power to resist rust. It did not, however, withstand the attacks of rust in the climate of Ottawa, this season, so well as several of our standard sorts.

Another very interesting variety, which has been named Aurora, may also be mentioned. It was obtained by the selection of a very early and strong plant obtained by growing some mixed wheat imported from India. The amount of seed of Aurora on hand did not permit the sowing of one-fortieth of an acre this season, but the small plot sown ripened on July 21st, having matured in the remarkably short time of 87 days. This is our earliest wheat. It produces hard red kernels of good quality, but appears to be only moderately productive and has short straw. It will be further tested. It was crossed with Red Fife in 1904 and the plants raised this season from the cross-fertilised seeds were vigorous and early. They seem likely to give rise to some important new wheats.

VISIT TO MANITOBA AND SASKATCHEWAN.

About harvest time the writer travelled through portions of Manitoba and Saskatchewan for the purpose of studying the wheat fields in those provinces as well as to inspect the uniform test plots of cereals on the branch experimental farms. The principal points visited were Indian Head, Brandon, Neepawa and Dauphin. Much information of value was obtained and many interesting samples of grain were collected. The wheat fields in both of the provinces visited were found almost invariably to contain a noteworthy proportion of varieties other than true Red Fife, amounting in some instances to about 50 per cent. Many of these sorts are easily distinguishable from Red Fife, and could be eliminated by any farmer who would take pains to purify his seed. The commonest kind is a bearded wheat with red chaff which has been known in some localities under the name of Assiniboia wheat. There are perhaps two or three slightly different varieties included under this name, but it may conveniently be used for them all as they are very much alike. Altogether there were found about fifteen varieties mixed with Red Fife. The study of these is not yet completed, but it appears that, with the exception of White Fife, which is seldom met with, they are all inferior to Red Fife for the production of strong flour, and are, therefore, a menace to the reputation of the wheat of these provinces. The varieties with very short heads (club wheats) are especially poor and should be regarded in almost the same light as noxious weeds.

CEREALS IN THE PEACE RIVER COUNTRY.

Samples of such varieties of grain as seem likely to be of value to settlers in the district drained by the Peace River are sent to them from time to time from this farm. Some reports and samples have been received back from these settlers.

Mr. Allan Brick, of Peace River Landing, sent very good samples of Stanley and Preston wheat and Tartar King oats from the crop of 1904.

Mr. Charles Bremner, of Spirit River, reported concerning the season of 1904: 'The barley (Odessa) produced good samples, also the oats (Tartar King), but the wheat was badly frozen in July and August.'

The Rev. Father Josse, O.M.I., of Spirit River, reported: 'The samples you sent us have succeeded very well. Both the wheats ripened all right (Stanley and Gehun). Odessa barley and Flying Scotchman oats have succeeded perfectly well. This year was a pretty dry one.'

The Rev. Robert Simpson, of Spirit River reported: 'The season was against us. We sowed on April 27th and all were ripe by August 25th. The Preston wheat and Tartar King oats yielded heavily. Of course the straw was shorter than it would have been had we had rain.'

The Rev. Brother Laurent, O.M.I., of the St. Bernard Mission, Little Slave Lake, reported that the Tartar King oats did very well, but that the varieties of wheat sent to him (Stanley, Preston and Early Riga) did not do so well as the Red Fern which has been grown there for four years. Odessa and Clifford barley did not suit the conditions in that section so well as the barley which was introduced several years ago.

Only one report on the results of the season of 1905 has thus far been received:

Mr. William Smith, of Fort Vermilion, reports that his samples were sown on June 6th and cut August 15th. The quantities sown were 1 lb. each, and the amounts harvested were: Preston wheat, 26 lbs.; Harold wheat, 11 lbs., and Flying Scotchman oats, 12 lbs. He says: 'The Preston wheat ripened fully as early as the Harold. The oats came to maturity about the same date as the wheat, and the kernels were plump and good.'

It is evident, from these reports, that great differences exist in the various sections of country drained by the Peace River, and that much further experimental work with cereals will be necessary before the possibilities in regard to grain growing there can be fully understood.

GRADES OF WHEAT IN THE MANITOBA INSPECTION DIVISION.

The results of the study of the various grades of wheat in the Manitoba Inspection Division (crop of 1904) have already been published in Bulletin No. 50 of the Experimental Farm series. For the purpose of making further observations on the character of the wheat some of the seed in each grade from No. 1 Hard to No. 5 was sown on this farm last spring, and observations were made, later in the season, on the character of the grain produced from each grade.

The proportion of heads not of the Red Fife type was determined for each grade with the following results:—

	Per cent.
No. 1 Hard	8·4
No. 1 Northern	9·8
No. 2 "	6·9
No. 3 "	6·2
No. 4 Extra	7·1
No. 4	9·3
No. 5	9·7

As the samples sown were thoroughly representative of the averages of the grades, the above figures show clearly that the lower grades contain, as a rule, about the same proportions of Red Fife as the higher grades. The figures given do not represent the total quantities of other varieties present, but only those which could be distinguished from Red Fife without much difficulty.

The weight of crop produced from the plot of each grade was not determined but was certainly greatest in the plots where good seed was sown.

The quality of the different samples of grain harvested was carefully observed. The differences found were, however, quite insignificant in most respects. Each sample contained about 98 per cent of hard kernels; but while practically all the kernels



Photo. by C. E. Saunders.

1, 2 AND 3 ARE TYPICAL HEADS OF RED FIFE, (ACTUAL SIZE.)
4 AND 5 ARE TYPICAL HEADS OF WHITE FIFE, (ACTUAL SIZE.

produced from the highest grades of seed had a red skin, the crop from No. 2 Northern and the grades below this showed a small proportion of kernels with a yellow skin. These are, of course, not necessarily inferior in quality, though less popular at present. In plumpness there was a very slight difference in favour of the crop from the higher grades.

The red chaff, bearded heads ('Assiniboia' wheat), which were the most conspicuous type present other than Red Fife, gave grain quite as free from soft kernels as the Red Fife and of a richer red colour. The Assiniboia did not ripen appreciably earlier than the Red Fife. These observations, as well as those made by the writer in the wheat fields of Manitoba and Saskatchewan, show clearly that the prevailing idea that this Assiniboia wheat is an early, soft variety of poor colour is quite erroneous. Though undoubtedly inferior to Red Fife for the production of strong, pale-coloured flour, the appearance of the grain is better than Red Fife if judged by the ordinary standards. This serves to show that colour and hardness alone are very poor indications of actual milling value.

DESCRIPTIONS OF VARIETIES OF WHEAT.

So far as the writer is aware no careful descriptions of the most important varieties of wheat which have been long under cultivation in Canada have ever been published. It seems necessary therefore to describe a few of our best known sorts, in regard to some of which considerable confusion and misunderstanding exist.

Red Fife (Scotch Fife).—Kernels red, inclined to pale rather than dark red, of medium size but somewhat short. Heads of medium length, averaging about 3¾ inches long at Ottawa, tapering, essentially beardless, but having, as a rule, a few elongated awns (generally from 3 to 7) towards the tip. In rare cases some of these awns may be as much as 1½ inches in length, but they are usually less than an inch long. In some instances the heads are devoid of conspicuous awns. Chaff smooth and usually of a straw-yellow colour, though in some climates it takes a faint reddish tinge, not sufficient however to cause any difficulty in separating the heads from those of other sorts with true red chaff. The spikelets are set at moderate distances apart, there being usually not less than 16 spikelets in head 3½ inches long and not less than 17 in a head 4 inches long. Straw stiff and of good length, usually about 46 inches long at Ottawa. Ripens rather late and gives a good yield. It makes exceptionally strong flour of a rich cream colour (not essentially white as is often supposed).

Red Fife was introduced into Canada by Mr. David Fife (not Fyfe), who happened to obtain one kernel of it mixed with a quantity of wheat which came to him from Dantzic by way of Glasgow. Red Fife is still grown in central Europe under the name of Galician. The variety from Hungary, known as Hungarian Mountain, appears also to be identical with Red Fife.

The annexed plates show some typical heads of Red Fife and of other similar varieties, and also some unusual heads of Red Fife. Owing to the similarity which exists between Red Fife and some other sorts any attempt at hand selection of the heads of Red Fife should be made only in fields of *known purity*. Any heads of White Russian which might be present would be almost sure to be picked out on account of their unusual length, and thus in the course of a few years by repeated selections of the largest heads a serious proportion of this poorer variety would inevitably be present. In the opinion of the writer it is unsafe as a rule to select Red Fife with a view to saving seed from specially large heads. The selection of *typical* heads should be the first aim.

White Fife.—A full description of this wheat is unnecessary as it is practically identical with Red Fife in all respects except in regard to the colour of the skin of the

kernel. Repeated tests at the experimental farms have shown that this wheat gives practically the same yield as Red Fife, and ripens at the same time, notwithstanding that many farmers believe the White Fife to be earlier and more productive. As found in commerce, White Fife seldom contains less than 20 per cent of red kernels, probably Red Fife and White Russian, but the kernels of true White Fife have a yellowish skin, quite distinct from the reddish skin of Red Fife. It is generally supposed that White Fife is inferior to Red Fife for milling purposes, but careful tests made by the writer showed that (using *pure* White Fife) the two varieties behaved in the same manner when milled and gave flour which was practically identical in colour, in power to absorb water, and in ability to produce a large, high loaf. The present prejudice against White Fife is clearly without just grounds, and arises from confusing soft starchy samples of Red Fife (which are unpopular among our millers) with White Fife. However, as the colour of the skin of each variety is constant, there is no difficulty in distinguishing soft Red Fife from either soft or hard White Fife. White Fife is not, as is sometimes supposed, essentially a soft wheat, but usually shows about the same degree of hardness as Red Fife grown in the same soil and climate.

White Russian.—Kernels red, rather large and inclined to be starchy. Heads tapering, essentially beardless (but usually with a few prominent awns at the tip), and above medium length, being as a rule about 4 inches long at Ottawa. Chaff yellowish, smooth. In typical heads the spikelets are set rather far apart. A head 4 inches long generally has 16 or fewer spikelets. Straw stiff and of good length, usually about 47 inches long at Ottawa. Ripens rather late and gives a good yield. This variety makes flour of a less pronounced cream colour than Red Fife, but the flour has distinctly less strength. White Russian should not be grown in those districts from which wheat is sold for export, as its production would tend to lower Canada's present enviable reputation for strength in wheat.

Wellman's Fife.—A prolonged and careful study of this wheat has satisfied the writer that it is the same as White Russian, mixed, however, as a rule, with a varying proportion of Red Fife. Its cultivation should be discouraged wherever the production of wheat of the highest quality is aimed at. It was obtained by Mr. D. L. Wellman, of Minnesota, who selected the best looking beardless heads out of a field of mixed wheats, obtained by him under the name of Saskatchewan Fife. Under such circumstances it was natural that the selection should consist chiefly of White Russian, the heads of which are above medium length. The average yield given by Wellman's Fife is practically identical with that obtained from White Russian.

Monarch.—This wheat is also a strain of White Russian, varying somewhat in its purity, and giving about the same average returns as that variety.

McKendry's Fife, which was re-selected at the Minnesota Experiment Station and was given the name 'Minnesota No. 181,' is another strain of White Russian. It gives a good yield, but shows as a rule little or no superiority over the original variety as grown at the Dominion Experimental Farms.

Minnesota No. 163 also appears to be identical with White Russian. In productiveness it has shown itself inferior to Minnesota No. 181.

Powers' Fife re-selected and sent out by the Minnesota Experiment Station under the name 'Minnesota No. 149,' is a pure strain of Red Fife of excellent quality, but it has proved somewhat less productive than the parent variety at all of the Dominion Experimental Farms except Indian Head, Sask.

Club.—This variety was obtained from a district in Manitoba, where it is being grown to some extent. It is not being tested in the larger plots at this farm on

account of its poor quality. Kernels rather dark red, of about medium size. Heads short, compact, thickened towards the tip, essentially beardless, but often having at the tip a few awns about half an inch long. Well-developed heads are about 2¾ inches long. Chaff reddish, smooth. Straw moderately stiff and of medium or below medium length. Ripens a few days before Red Fife. Rusts rather badly, as a rule, at Ottawa, but produces good kernels in some parts of Manitoba. In spite of the excellent appearance of this wheat, when grown under favourable conditions, it is to be *entirely condemned* for purposes of export or for the production of strong, pale flour at home. The colour of the flour made from Club wheat is a dark unattractive yellow—not at all to be compared with the fine cream colour of Red Fife flour. In gluten also the Club shows itself very deficient, having a much smaller quantity than the Red Fife and the gluten being of inferior quality. In making dough from Club wheat flour it was found that less water was taken up than in making dough from Red Fife, and the volume of the loaf produced was smaller. The general appearance of bread made from Club wheat flour is extremely poor, and there is no doubt that if this wheat were grown to any large extent in Manitoba it would seriously injure the present high reputation of the wheat of that province.

Unfortunately, owing to the fact that the market value of Manitoba wheat is determined by colour and hardness rather than by quality for flour production, Club wheat commands a good price, being generally quite hard and of a rich red colour. Indeed, the writer has been informed that it sometimes commands a higher price than pure Red Fife.

Hungarian White.—This variety was obtained from a seedsman in Germany. It is a promising sort, being fairly early in ripening and of good quality. Kernels red, of about medium size, but somewhat elongated. Heads bearded, tapering, of about medium size. Chaff yellowish, smooth. Straw moderately stiff and of good length. Ripens a little before Red Fife. Makes excellent, strong flour. This wheat resembles Red Fern in many respects, but is distinguished from that variety by the greater length of kernel in the Hungarian.

FIFE WHEATS.

Having endeavoured to give a satisfactory definition of true Red Fife and of some of the other so-called Fife wheats, it would seem desirable to state if possible the distinguishing characters of the Fife group, especially since the Grain Inspection Act of 1904 is so worded as to require certain proportions of red wheat of the Fife class in all but one of the higher grades in the Manitoba Inspection Division. It would have been convenient to reserve the name Fife for varieties similar to true Red Fife or White Fife in general appearance and quality, but the term is already in use, as we have seen, for different strains of White Russian, a wheat which produces flour having distinctly less strength than that made from Red Fife. It seems impossible, therefore, at present to give any narrow limitation to the term. The effect of the Grain Inspection Act is, naturally, to broaden the meaning of the word Fife (in the absence of any legal definition of it) to include all varieties of spring wheat grown in the prairie provinces.

CEREALS IN SMALL PLOTS.

An alphabetical list of the principal varieties of the different cereals grown in small plots during the past season is here given. The total number of these plots was 216. Those varieties which are given under letters and numbers are new sorts produced at this Farm, but not yet named.

Spring Wheat

3 B 3 (Dawn × Red Fife).
6 F 2 (Red Fife × Polish).
6 T " "
7 D (Red Fife × Roumanian).
7 E " "
8 C (Red Fife × Goose).
9 G (Common Emmer × Colorado Wheat).
9 J 3 " "
10 F (Colorado Wheat × Common Emmer).
Advance (2 strains).
Alpha (selected).
Aurora.
Banat.
Bearded March.
Beaudry
Bishop (6 strains).
Bobs.
Burkinshaw's Early.
Campbell's White Chaff,
Cape.
Chester (selected).
Club.
Countess (selected).
Downy Riga (5 strains).
Early Haynes' Blue Stem.
Early Sonora.
Ebert (selected).
Eurasian.
Fraser Red.
Grant (3 strains).
Gurke.
Herisson Beardless.
Hindoo.
Hungarian Mountain.
Huron (4 strains).
Japanese.
John Brown.
Ladoga (Black Sea).
Liberty.
Markham (2 strains).
Miller.
Moscow.
Naples.
Nixon A.
Onegafife.
Onegagehun.
Outlook.
Percy (2 strains).
Persian Black.
Preston (10 strains).
Pringle's Champlain (3 strains).
Pringle's Defiance.
Prospect (2 strains).
Red Bearded.
Red Fife (12 strains).
Red Preston.
Red Riga (3 strains).
Red Swedish.
Riga (2 strains).
Robin's Rust Proof.
Sicilian.
Spence Yellow.
Stanley (3 strains).
Strubes.
White Fife (5 strains).
Yellow Cross.
Yellow Fife.

Macaroni or Durum Wheat.

Adjini Red.
Arneutka.
Italian.
Madonna.
Mahmoudi Yellow.
Polish.
Red Indian.
Sleaford.
Sorentino.

Emmer and Spelt.

9 H 2 (Common Emmer × Colorado Wheat).
9 K 2 " "
Black Bearded Spelt.
Double Emmer.

Oats.

Abyssinia.
Aitken Black.
Australian.
Banner (2 strains).
Bayonet.
Bergs (black).
Beseler.
Black Mesdag.
Bonanza.
Brown Algerian.
California Prolific (black).
Clydesdale.
Cream Egyptian.
Doncaster Prize.
Early Archangel.
Early Blossom.
Early British.
Early Maine.
Early Ripe.
Eureka.
Flying Scotchman.
Leutenwitzer.
Liberty.
Longhouton.
Newmarket.
Norwegian Black.
Oderbruch.
Prince Royal.
Rennie's Prize White.
Salines.
Scottish Chief.
Selchower.
Selected Columbus.
Selected Daubeney.
Selected White Giant.
Sheffield Standard.
Tobolsk.
Tunis (brown).
Victoria Prize.
White Russian.
White Schonen.
White Wonder.
Zhelannii.

Six-row Barley.

Blue Short Head.
Hulless White (beardless).
Petschora.
Phœnix.
Small Blue Naked.
Success (beardless).
Surprise.
Taganrog.
Vanguard.

Two-row Barley.

Black Two-row.
Early Chevalier.
Erfurt White.
Gambrinus.
Hofbrau.
Improved Thanet.
Jewel.
Kinver Chevalier.
Large Naked.
Prize Prolific.
Triple Naked (beardless).

Peas.

Alma.
Arthur (2 strains).
Bright.
Bruce.
Centennial.
Creeper.
Elder.
Elephant Blue.
Fergus.
Forrest.
French Canner.
Green Marrowfat.
Harrison's Glory.
Maple.
Multiplier.
New Potter.
Norwegian Grey.
Oddfellow.
Perth.
Trilby.

Rye.

Ottawa Select (spring).
Dominion (winter).

UNIFORM TEST PLOTS OF CEREALS, FIELD ROOTS AND FODDER CORN.

The standard and new varieties of cereals which are obtainable commercially are annually grown in plots of one-fortieth of an acre, along with the cross-bred sorts produced at the Farms and a number of other varieties obtained from various sources. The field roots and fodder corn are grown in similar plots, and the yield per acre is usually estimated from the crop obtained from one-hundredth of an acre. The object of these tests is to determine the relative productiveness, earliness, &c., of the different varieties. Those which for a series of years are found to be distinctly inferior are rejected, and strong efforts are made to keep the list within as small bounds as possible without omitting anything which may ultimately prove of value.

The number of these larger plots grown during the past season was as follows:—Spring wheat, 59; macaroni wheat, 11; winter wheat, 19; emmer and spelt, 10; oats, 79; six-row barley, 41; two-row barley, 25; winter barley, 1; peas, 33; spring rye, 1; winter rye, 4; mixed grain, 6; soja beans, 2; field beans, 4; flax, 7; millet, 6; turnips, 20; mangels, 17; carrots, 11; sugar beets, 8; Indian corn, 33; making a total of 397 plots. These represent about 340 varieties.

Some of the varieties mentioned in the Report of the Experimental Farms for 1904, have been discontinued on account of lateness, small yield, or for other defects.

PREPARATION OF LAND FOR THE UNIFORM TEST PLOTS.

The system of cultivation adopted for the land devoted to the experimental plots is necessarily somewhat different from that which is generally considered advisable in ordinary farming; but it is worthy of mention that abnormally large quantities of fertilising material are not employed. The land used for the plots consists of three separate fields, and a three-year rotation is practised. Each field receives every third year a dressing of fresh barn-yard manure. This has been applied in the past at the rate of only twelve tons per acre, but this amount has been found insufficient whenever the manure has not been of the highest strength. The quantity is therefore being increased to 18 tons per acre. This is at the rate of 6 tons per acre for each year. While this is a somewhat larger quantity of barn-yard manure than is used in ordinary farming, it must be remembered that there is no opportunity in this case for the ploughing under of sod or for allowing the land to be used sometimes for pasture, as is the common practice. For these reasons it seems necessary to apply the manure in somewhat greater quantities than usual, though it cannot be fairly claimed that the land is unduly enriched by this method. The manure is spread on the ground and ploughed under in spring. The field is then used for roots, fodder corn and other

hoed crops. In the autumn, after the harvest is over, the land is ploughed about seven inches deep, and is left in that condition until the following spring, when it is cultivated twice with a two-horse cultivator and harrowed twice with a smoothing harrow. Cereals are then sown. After the grain is harvested the land is ploughed about three or four inches deep, to start the shed grain and any weed seeds present, and is again ploughed a few weeks later about seven inches deep. In the following spring it is prepared as before and cereals are again sown. It is not, however, the practice to sow the same cereal twice in succession on the same piece of land.

SELECTION OF SEED FOR UNIFORM TEST PLOTS.

In order to obtain the seed for the uniform test plots in the best condition, and as nearly as possible in a state of absolute purity, selected heads are gathered by hand from the plots just before the grain is cut. About eight pounds of heads are harvested in this way. During the winter these selected samples are carefully threshed and cleaned by hand; and the grain to be sown the next season is thus brought to a very high standard of purity. This method has been used for several years with wheat and barley; and is being continued with these grains. In oats, however, the selection of heads is not usually carried out unless the grain in the plot shows signs of being mixed. It is much more difficult to select the heads of oats; and the plots are always injured more or less while the work is being done, on account of the growth of the oats being very thick.

In all cases, when the seed for the plots is not obtained by hand selection in the field, the crop is thoroughly screened and carefully hand-picked before any of it is sown.

IMPORTANCE OF EARLY SOWING OF CEREALS.

Repeated tests have been made at this Farm to ascertain the best time in spring for the sowing of cereals in order to obtain the largest possible yield. The experiments have proved that in this climate cereals should generally be sown about as soon as the land can be brought into proper condition. The reduction in yield due to delay in seeding is usually considerable, even when the delay is only a week long. The loss is especially serious with wheat and oats, and is sometimes quite disastrous in seasons when rust is abundant. The comparatively large yields obtained in the experimental plots on this Farm are due in part to early sowing.

The best time for sowing cereals on this Farm has been found to be from about April 20th to 26th in an ordinary season.

WEATHER.

The past season was on the whole very favourable for crops. The weather during the spring and early summer months was about normal in character, but in July and August there were some heavy storms which caused the grain to lodge to a considerable extent. Such severe tests of the strength of straw are, however, of great value in experimental work. Rust on cereals was prevalent, but did less damage than in the previous season. Field roots and Indian corn gave good yields owing to the abundance of moisture throughout the season, and would no doubt have done even better had not the general character of the season been somewhat cool.

SPRING WHEAT.

The following varieties of spring wheat were added to the uniform test plots this season:—

Hungarian White.—See 'Descriptions of Varieties of Wheat.'

Kirsche.—This wheat was received from Mr. A. Kirsche of Pfiffelbach-Apolda. It produces large red kernels. The head is short and beardless, slightly tapering, and with the spikelets set very close together. The chaff is smooth and somewhat reddish. As this wheat is late in ripening, is badly affected by rust and shows very distinct lack of strength in its gluten it seems unnecessary to further test it in this country.

The plots of wheat were sown on April 24th, and were all one-fortieth of an acre in extent. The seed was used at the rate of 1½ bushels to the acre. The soil was a loam of good quality.

The yield per acre is expressed in 'bushels' of 60 pounds.

*Varieties produced at the Central Experimental Farm are marked with an asterisk.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Australian F	Aug. 3	101	46 to 48	Stiff	3½ to 4	39	40	60	Badly.
2	Chester*	July 29	96	49 " 51	Medium	3¼ " 3¾	37	40	60	Considerably.
3	Wellman's Fife	Aug. 5	103	50 " 52	Stiff	3½ " 4	36	20	60	Slightly.
4	Advance*	" 3	101	52 " 54	"	3½ " 4	36	..	60½	"
5	Australian No. 12	" 2	100	47 " 49	"	3 " 3½	35	20	57¼	Considerably.
6	Early Riga*	July 27	94	45 " 47	Medium	2¾ " 3¼	35	..	60¼	"
7	Preston*	Aug. 2	100	47 " 49	Stiff	3½ " 4	34	20	61	"
8	Pringle's Champlain	" 1	99	45 " 47	Weak	3¼ " 3¾	34	20	60	"
9	Gehun	July 26	93	45 " 47	Medium	2¾ " 3¼	34	20	59	"
10	Dawn*	Aug. 3	101	47 " 49	Stiff	3½ " 4	34	20	59½	"
11	Huron*	" 5	103	50 " 52	"	3¼ " 3¾	33	30	59	Slightly.
12	Red Fife	" 7	105	48 " 50	"	3 " 3½	33	20	59	Badly.
13	Red Fern	" 3	101	52 " 54	"	3½ " 4	33	20	62¼	Slightly.
14	McKendry's Fife (Minn. 181)	" 5	103	50 " 52	"	3½ " 4	33	..	61	"
15	Hungarian White	" 5	103	47 " 49	Medium	3¾ " 4¼	33	..	60¾	"
16	Riga*	July 27	94	46 " 48	Stiff	3 " 3½	33	..	60	Considerably.
17	Downy Riga*	" 27	94	45 " 47	Medium	2¾ " 3¼	32	50	60	"
18	Laurel*	Aug. 7	105	47 " 49	"	3¼ " 3¾	32	40	58¾	Slightly.
19	Stanley*	" 2	100	47 " 49	Stiff	3½ " 4	32	20	59	Considerably.
20	White Russian	" 14	112	51 " 53	Weak	3½ " 4	32	20	56½	Badly.
21	Australian No. 9	" 2	100	41 " 43	Medium	3¼ " 3¾	32	20	59½	Considerably.
22	Monarch	" 8	106	47 " 49	Stiff	3¼ " 3¾	31	40	59½	Slightly.
23	Ebert*	July 29	96	44 " 46	Medium	3 " 3½	31	20	59¼	Badly.
24	Colorado	Aug. 5	103	48 " 50	"	3 " 3½	31	..	58	Considerably.
25	Bishop*	" 1	99	46 " 48	"	3¼ " 3½	30	40	56¾	"
26	Clyde*	" 7	105	46 " 48	Weak	3¼ " 3½	30	40	59	Badly.
27	Minnesota No. 163	" 8	106	51 " 53	Stiff	3 " 3½	30	20	60	Slightly.
28	Australian No. 28	" 3	101	44 " 46	"	3 " 3½	29	40	60	Considerably.
29	Herisson Bearded	" 8	106	48 " 50	Medium	1½ " 2	29	20	61	"
30	Countess*	" 2	100	47 " 49	"	3¼ " 3¾	29	..	59	"
31	Percy*	" 2	100	47 " 49	Stiff	3½ " 4	28	40	59½	"
32	White Fife	" 8	106	47 " 49	"	3¼ " 3¾	27	20	60	Slightly.
33	Nixon*	" 8	106	48 " 50	"	3 " 3½	27	..	60½	Considerably.
34	Haynes' BlueStem(Minn. 169)	" 7	105	51 " 53	Medium	3½ " 4	27	..	57½	"
35	Marvel	" 14	112	52 " 54	Weak	3¾ " 4¼	26	40	55	Badly.
36	Power's Fife (Minn. 149)	" 8	106	47 " 49	Stiff	3¼ " 3¾	26	40	60½	Slightly.
37	Weldon*	" 5	103	48 " 50	Medium	3 " 3½	26	20	59	Badly.
38	Blue Stem	" 14	112	51 " 53	"	3½ " 4	25	20	56	"
39	Saumur	" 14	112	43 " 45	Weak	2½ " 3	25	20	56	"
40	Pearl	" 14	112	51 " 53	Stiff	3 " 3½	23	40	58	"
41	Kirsche	" 15	113	47 " 49	"	2 " 2½	20	20	57	"

Most Productive Varieties of Spring Wheat.—Excluding the macaroni wheats, which are considered separately, the most productive varieties of spring wheat at this Farm for the last five years have been Preston, Herisson Bearded, Advance and Pringle's Champlain. Huron and Red Fern have given almost as large yields. All of these are bearded wheats, Pringle's Champlain and Red Fern being probably the best for milling purposes.

Among the most productive beardless varieties may be mentioned Red Fife, White Fife, White Russian and Laurel. Of these Red Fife and White Fife are the best for making strong flour.

Earliest Varieties of Spring Wheat.—The earliest variety of spring wheat grown on this Farm during the past season was Aurora. Only a very small amount of seed of this wheat is on hand, and it is not yet available for distribution. The earliest varieties grown in the regular plots were Early Riga, Ebert, Riga, Downy Riga and Gehun. These ripen as a rule about two weeks before Red Fife or White Fife at this Farm. The variety called Bishop, which was described in the report for last year, ripens about 4 or 5 days later than the earliest group, and the well-known sorts, Preston and Stanley, ripen about 2 or 3 days later than Bishop.

The very early sorts mentioned are being selected and propagated, but thus far an extremely limited distribution of one or two of them is all that is possible. Such samples are only sent when there is good reason to believe that they will be of real value to the farmers applying for them. It should be kept in mind that extreme earliness is usually associated with a rather low yield and short straw. It is therefore often unwise to grow such wheats in districts where the ripening season is long enough to mature the more vigorous sorts such as Preston, Stanley, Pringle's Champlain or the still later varieties Red Fife and White Fife.

The earliest kinds of wheat which are as yet included in the regular distribution enough to mature the more vigorous sorts such as Preston, Stanley, Pringle's Champlain. Stanley and Percy are beardless sorts.

MACARONI OR DURUM WHEAT.

The term 'macaroni' wheat is generally employed to designate those extremely hard varieties with large kernels of which 'Goose' or 'Wild Goose' is the best-known example in Canada. The different sorts of macaroni wheat are by no means identical in quality, though they are usually considered to be so. They are looked upon with disfavour by millers; and farmers who grow any wheat of this class should exercise great care to prevent it from becoming mixed with wheat which is to be sold for flour-making.

As a rule, these wheats suffer less from drought and from rust than other sorts. They may, therefore, in some cases, be grown to advantage, especially in any rather dry district where rust is apt to be severe. They are not, however, to be generally recommended for damp climates. It should also be borne in mind that the market price of macaroni wheat is usually lower than that paid for varieties of wheat which are popular for milling purposes.

The plots of macaroni wheat were one-fortieth of an acre in extent. The seed was sown on April 20th at the rate of $1\frac{3}{4}$ bushels to the acre. The soil was a sandy loam.

The yield per acre is expressed in 'bushels' of 60 pounds.

MACARONI WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per acre.	Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush. Lbs.	Lbs.	
1	Roumanian	Aug. 3	105	48 — 50	Stiff	2½ — 3	40 20	62½	Slightly.
2	Beloturka	" 3	105	46 — 48	Medium	2¼ — 2¾	39 ..	64½	Considerably.
3	Yellow Gharnovka	" 3	105	49 — 51	Stiff	2¾ — 3¼	37 ..	62½	"
4	Gharnovka	" 3	105	49 — 51	"	2¾ — 3¼	32 20	61½	"
5	Black Don	" 7	109	48 — 50	Medium	2¼ — 2¾	28 40	59½	Slightly.
6	Velvet Don	" 5	107	48 — 50	Stiff	2¼ — 2¾	28 20	59¼	Considerably.
7	Kahla	" 4	106	45 — 47	"	2¼ — 2¾	26 20	57	"
8	Kubanka	" 8	110	50 — 52	"	2 — 2½	25 40	62	Slightly.
9	Goose	" 7	109	46 — 48	"	2¼ — 2¾	20 40	63	"
10	Mahmoudi	" 7	109	42 — 44	Medium	2¼ — 2¾	20 20	58	Considerably.
11	Medeah	" 4	106	44 — 46	Stiff	2½ — 3	19 .	59	"

Roumanian, which stands at the head of the list this year, has also given the highest average yield during the past five years.

WINTER WHEAT.

The plots of winter wheat were sown on September 8th, 1904. All the plots were one-fortieth of an acre, and the seed was used at the rate of 1¾ bushels to the acre. The soil was a clay loam.

Owing to the cool weather which prevailed in September and October the growth on the plots was less vigorous than usual when winter set in. The ample covering of snow, however, prevented serious injury during the cold weather, and the plots made good growth in the spring and early summer. An unusually heavy crop of grain was harvested.

The well-known variety, Turkey Red, is omitted from the plots this season, owing to the fact that the seed was not in a satisfactory condition. Two new strains of selected Turkey Red were obtained this past summer, one from the Kansas Experiment Station (Turkey Red No. 380), and the other through the Department of Agriculture at Washington. These were sown in the plots this autumn.

WINTER WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per acre.	Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush. Lbs.	Lbs.	
1	American Banner	July 21	316	49 — 51	Stiff	2¾ — 3¼	50 ..	60	Considerably.
2	Gold Coin	" 20	315	49 — 51	"	2¾ — 3¼	49 ..	60	"
3	Jones' Winter Fife	" 20	315	51 — 53	"	3¼ — 3¾	45 20	61	"
4	Abundance	" 21	316	50 — 52	"	3 — 3½	43 40	59	"
5	Early Red Clawson	" 21	316	54 — 56	Weak	3 — 3¾	43 ..	60	Badly.
6	Dawson's Golden Chaff	" 20	315	49 — 51	Stiff	3 — 3⅕	42 20	60	Considerably.
7	Prosperity	" 21	316	51 — 53	"	3¼ — 3¾	42 20	61	Slightly.
8	Kharkov	" 23	318	46 — 48	Medium	2¼ — 2¾	41 ..	61½	Considerably.
9	Red Chief	" 21	316	51 — 53	"	2½ — 3¼	40 40	57¾	"
10	Buda Pesth	" 20	315	52 — 54	"	3 — 3¾	39 40	60¾	Slightly.
11	Early Windsor	" 21	316	46 — 48	Stiff	2¾ — 3¼	39 20	60	"
12	Invincible	" 21	316	48 — 50	"	3½ — 4	37 40	60¾	"
13	Egyptian Amber	" 24	319	50 — 52	"	3 — 3¾	36 20	60	Considerably.
14	Red Velvet Chaff	" 20	315	45 — 47	"	3 — 3⅕	35 40	60½	"
15	Silver Sheaf	" 20	315	55 — 57	"	3¾ — 4¼	35 40	60½	Slightly.
16	Imperial Amber	" 24	319	55 — 57	"	3¾ — 4¼	34 ..	62	Considerably.
17	Padi	" 22	317	44 — 46	"	2¾ — 3¼	31 40	59	Slightly.
18	Reliable	" 25	320	46 — 48	"	3¼ — 3¾	30 ..	60	Considerably.

EMMER AND SPELT.

The plots of emmer and spelt were one-fortieth of an acre. The grain was sown on April 20th, at the rate of about 120 lbs. per acre. The soil was a clay loam.

Long Emmer and Single Emmer will be rejected from the plots next year on account of their extreme lateness in ripening.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Lbs.	Lbs.	
1	White Spelt	Aug. 11	113	49 — 51	Stiff	4¼ — 4¾	2,400	27½	Considerably.
2	Smooth Spelt	" 15	117	44 — 46	"	3¾ — 4¼	2,120	28	Slightly.
3	Common Emmer	" 1	103	46 — 38	"	1½ — 2	2,060	36½	"
4	Thick Emmer	" 3	105	43 — 45	"	2½ — 3	2,060	30½	Considerably.
5	White Emmer	" 8	110	45 — 47	"	2½ — 3	1,920	30	Slightly.
6	Red Emmer	" 8	110	41 — 43	"	2¼ — 2¾	1,880	32	"
7	Long Emmer	" 23	125	47 — 49	"	3¾ — 4¼	1,660	27	"
8	Red Spelt	" 14	116	46 — 48	"	3½ — 4	1,620	29	"
9	White Bearded Spelt	" 14	116	47 — 49	"	3¾ — 4¼	1,620	27½	"
10	Single Emmer	" 30	132	34 — 36	"	2½ — 3	1,380	24½	"

OATS.

The varieties added to the plots this season are:—

Dinauer and *Fichtel Mountain*.—These were obtained from Germany. They are white oats with loose, open heads.

Kirsche.—This was obtained from Mr. A. Kirsche, of Pfiffelbach-Apolda. It is a white oat with a loose, open head.

Green Russian.—This variety is grown in some parts of Manitoba, but had not been tested, previously, at this Farm. It is a mixture of at least two sorts, white and yellow, both having loose, open heads.

The plots were sown on April 26th and 27th; the seed being used at the rate of two bushels per acre for most varieties, but in somewhat greater quantities whenever the oats were of unusually large size. The plots were one-fortieth of an acre. The soil varied from a sandy loam to a clay loam.

The yield per acre is expressed in 'bushels' of 34 pounds.

*Varieties produced at the Central Experimental Farm are marked with an asterisk.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Banner	July 31	96	40 — 42	Medium	7½ — 8¼	84	4	32¾	Considerably.
2	White Giant	Aug. 1	97	41 — 43	"	7 — 7¾	84	4	33½	"
3	Uberfluss	July 31	95	45 — 47	Weak	7½ — 8½	80	..	31½	Badly.
4	Bavarian	Aug. 1	96	42 — 44	Medium	8 — 9	77	22	32	Considerably.
5	Improved American	" 1	97	42 — 44	Stiff	7½ — 8½	77	22	33½	"
6	Danish Island	July 31	95	44 — 46	"	8¼ — 8¾	75	10	34½	"
7	Golden Tartarian	Aug. 6	101	41 — 43	"	9 —10	75	10	30	Badly.
8	Pioneer (black)	July 26	90	41 — 43	"	7½ — 8½	74	24	33	"

OATS—TEST OF VARIETIES—*Concluded.*

Number.	Name of Variety.	Date of Ripening.	No. of Days maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.	Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush. Lbs.	Lbs.	
9	Probstey	Aug.	1	97 47 — 49	Medium	7¼ — 8	74 24	34	Badly.
10	Fichtel Mountain	July	26	91 38 — 40	"	7 — 8	74 4	34½	"
11	Lincoln	"	31	96 45 — 47	Stiff	7¼ — 7¾	73 18	35	Considerably.
12	Abundance	Aug.	1	97 40 — 42	"	7½ — 8½	72 32	31	Badly.
13	Welcome	July	30	94 44 — 46	Medium	7 — 8	72 32	35	"
14	Twentieth Century	"	27	92 44 — 46	Stiff	7 — 8	72 32	36	"
15	Kirsche	"	31	95 40 — 42	Medium	7½ — 8½	72 32	35	Considerably
16	Mennonite	"	26	91 38 — 40	Stiff	6 — 7	72 12	33	Badly.
17	Early Golden Prolific	Aug.	1	97 42 — 44	Medium	7½ — 8½	71 26	33⅓	Considerably.
18	Goldfinder	"	2	98 44 — 46	Stiff	7 — 8	71 26	32⅔	Badly.
19	Holstein Prolific	"	1	96 43 — 45	Medium	7 — 8	71 6	33⅓	"
20	Golden Beauty	July	30	94 44 — 46	Stiff	7½ — 8½	70 20	33	"
21	Thousand Dollar	"	26	91 42 — 44	"	6½ — 7½	70 20	35½	"
22	Bell (black)	Aug.	1	96 45 — 47	Weak	8 — 9	70 20	32	"
23	American Triumph	"	1	97 40 — 42	"	7 — 8	70 ..	34	"
24	Dixon*	"	1	96 44 — 46	Medium	8 — 9	70 ..	34¾	Considerably.
25	American Beauty	July	26	91 43 — 45	Stiff	7½ — 8½	69 14	35	"
26	Improved Ligowo	"	30	94 45 — 47	Medium	7⅓ — 8⅓	68 28	36	"
27	Black Beauty	"	31	95 41 — 43	"	7½ — 8½	68 28	31	Badly.
28	Whiting	"	30	94 41 — 43	"	7 — 8	68 28	35	Considerably.
29	Waverley	"	30	94 42 — 44	"	7½ — 8¼	68 8	34¾	"
30	Virginia White Abundance	Aug.	1	97 40 — 42	Stiff	7⅓ — 8⅓	68 8	36	Badly.
31	Excelsior (black)	July	25	89 41 — 43	"	7¾ — 8½	68 8	34	Considerably.
32	Milford White*	"	30	94 39 — 41	"	7 — 8	68 8	32½	Badly.
33	Gold Rain	Aug.	1	96 42 — 44	Stiff	8 — 8⅓	68 8	35½	Badly.
34	Irish Victor	July	30	95 47 — 49	Medium	8 — 8¼	67 22	32	"
35	Kendal Black*	Aug.	1	96 38 — 40	Stiff	7½ — 8⅓	67 22	33	Considerably.
36	Olive Black*	"	1	96 40 — 42	"	8 — 8¾	67 22	35	Badly.
37	Wide Awake	July	31	95 42 — 44	"	6¾ — 7½	67 2	35	"
38	Swedish Select	"	30	94 45 — 47	Medium	7 — 8	67 2	35	"
39	Scotch Potato	Aug.	1	96 39 — 41	Stiff	8 — 9	67 2	34	"
40	Green Russian	July	26	91 40 — 42	"	7 — 8	67 2	31	Considerably.
41	Golden Fleece	"	31	96 43 — 45	Medium	7½ — 8½	67 2	32⅓	"
42	Tartar King	"	26	91 42 — 44	Stiff	8 — 9	65 30	32½	Badly.
43	Forbes*	Aug.	7	103 42 — 44	"	9¼ —10¼	65 30	28	"
44	Hazlett's Seizure	Jnly	31	96 38 — 40	"	7¾ — 8⅓	65 10	33	"
45	Atlantic	"	30	94 42 — 44	"	8 — 9	64 24	35½	Considerably,
46	Columbus	"	30	95 44 — 46	Weak	7¾ — 8¼	64 4	32	Badly.
47	Joanette (black)	Aug.	1	96 34 — 36	Stiff	6⅓ — 7⅓	63 18	33½	Considerably.
48	Siberian	July	30	94 40 — 42	"	8 — 9	62 32	34	Badly.
49	Bestehorn's Abundance	Aug.	1	97 40 — 42	"	7⅓ — 8⅓	62 32	32½	"
50	Big Four	"	2	97 42 — 44	"	7½ — 8⅓	62 32	32	Considerably.
51	Daubeney	July	19	84 37 — 39	"	5¾ — 6⅔	62 32	32½	"
52	Great Northern	Aug.	1	97 39 — 41	Medium	7¼ — 7⅔	62 32	35	"
53	Kendal White*	July	31	95 41 — 43	Stiff	6¾ — 7⅓	62 32	34	Badly.
54	Sorgenfrei	"	27	91 36 — 38	"	6½ — 7½	62 12	35¼	Considerably.
55	Buckbee's Illinois	"	30	94 42 — 44	Medium	7 — 8	62 12	39	Badly.
56	Milford Black*	"	31	95 46 — 48	Stiff	8 — 9	61 26	36⅓	"
57	Storm King	"	31	95 47 — 49	Weak	8 — 9	61 26	33⅓	"
58	Garton's Abundance	Aug.	1	97 40 — 42	Stiff	7⅓ — 8⅓	60 ..	35⅓	"
59	Swedish Ligowo	July	27	91 44 — 46	"	6½ — 7½	60 ..	37⅓	"
60	Dinauer	"	31	96 41 — 43	"	7½ — 8⅓	58 8	32½	"
61	Colossal	"	27	92 48 — 50	"	8 — 9	54 4	28	"
62	Early Angus	Aug.	7	102 45 — 47	"	9½ —10½	54 4	34	"
63	Sensation	July	31	95 42 — 44	"	7 — 8	52 32	36	Considerably.
64	Golden Giant	Aug.	7	103 38 — 40	"	8 — 9	52 12	28	Badly.
65	Tlola	July	20	84 41 — 43	Medium	7¾ — 8½	49 14	31	Considerably.
66	Anderbecker	"	31	95 42 — 44	Stiff	6⅓ — 7⅓	49 14	35¾	"
67	Chinese Naked	"	30	94 43 — 45	Medium	7½ — 8½	45 10	45½	Badly.

Most Productive Varieties of Oats.—Among the most productive varieties of oats grown for the past five years at this Farm the following white varieties deserve special notice:—Banner, White Giant, Lincoln, and Virginia White Abundance. Among the mixed sorts (white and yellow), Uberfluss and Holstein Prolific have given large re-

turns. The most productive of the pure yellow oats have been Mennonite and Columbus. The most productive black oat has been Black Beauty.

Earliest Varieties of Oats.—Among the earliest varieties of oats should be mentioned Tartar King, Welcome and Daubeney. These are all white oats and give a fair crop, but farmers are advised not to grow them except in cases where earliness is of very great importance. The white oats mentioned in the preceding paragraph will generally be found more profitable.

SIX-ROW BARLEY.

The *Mandscheuri* barley introduced into the plots this year is a strain obtained from Prof. Zavitz, of the Ontario Agricultural College. Mandscheuri and Mensury are probably different strains derived from the same original Manchurian barley. While it is to be regretted that such remarkable names are in use, we must accept them as they are. The two strains of this barley were grown side by side this year, and are being carefully compared to determine, especially, which of them gives the larger average yield in the climate of Ottawa. The results of the present season are very striking, but, of course, a single test cannot be considered here as conclusive.

The plots were all one-fortieth of an acre. The seed was sown on April 26, at the rate of $1\frac{3}{4}$ bushels to the acre. An unusually heavy crop was obtained. The soil was a clay loam.

The yield per acre is expressed in 'bushels' of 48 pounds.

* Varieties produced at the Central Experimental Farm are marked with an asterisk.

SIX-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Nugent*	July 24	89	42 — 44	Stiff	$2\frac{3}{4}$ — $3\frac{1}{4}$	72	24	46	Slightly.
2	Mensury	" 21	86	39 — 41	Medium	3 — $3\frac{1}{4}$	71	12	46	"
3	Albert*	" 24	89	40 — 42	Weak	$3\frac{1}{4}$ — $3\frac{3}{4}$	70	40	$47\frac{1}{2}$	"
4	Trooper*	" 22	87	41 — 43	Stiff	$2\frac{3}{4}$ — $3\frac{1}{4}$	69	8	47	"
5	Oderbruch	" 24	89	43 — 45	"	$2\frac{3}{4}$ — $3\frac{1}{4}$	68	16	$46\frac{1}{2}$	"
6	Odessa	" 21	86	42 — 44	Medium	$3\frac{1}{4}$ — $3\frac{3}{4}$	66	12	46	"
7	Common	" 20	85	39 — 41	Weak	3 — $3\frac{1}{4}$	65	20	49	"
8	Summit*	" 20	85	42 — 44	Medium	$3\frac{1}{4}$ — $3\frac{3}{4}$	63	36	$45\frac{1}{2}$	"
9	Claude*	" 22	87	43 — 45	Weak	3 — $3\frac{1}{2}$	62	24	$47\frac{1}{2}$	"
10	Brome*	" 24	89	38 — 40	Medium	$2\frac{3}{4}$ — $3\frac{1}{4}$	61	12	48	"
11	Mandscheuri	" 23	88	42 — 44	"	3 — $3\frac{1}{2}$	61	12	46	"
12	Black Japan	" 20	85	32 — 34	"	$1\frac{3}{4}$ — $2\frac{1}{4}$	60	40	45	Considerably.
13	Silver King	" 21	86	40 — 42	"	$3\frac{1}{4}$ — $3\frac{3}{4}$	58	36	$47\frac{1}{2}$	Slightly.
14	Escourgeon	" 23	88	39 — 41	Weak	$2\frac{1}{2}$ — 3	57	24	$48\frac{1}{2}$	"
15	Argyle*	" 24	89	43 — 45	Medium	$2\frac{1}{2}$ — 3	56	12	48	"
16	Stella*	" 24	89	44 — 46	Stiff	3 — $3\frac{1}{2}$	55	20	47	"
17	Royal*	" 22	87	40 — 42	Medium	3 — $3\frac{1}{2}$	54	28	$46\frac{1}{2}$	"
18	Sisolsk	" 20	85	40 — 42	"	3 — $3\frac{1}{2}$	51	32	47	"
19	Hulless Black	" 19	84	37 — 39	Weak	$1\frac{1}{2}$ — 2	50	..	62	Considerably.
20	Yale*	" 25	90	42 — 44	Stiff	$2\frac{3}{4}$ — $3\frac{1}{4}$	49	28	$48\frac{1}{2}$	Slightly.
21	Mansfield*	" 24	89	41 — 43	"	$2\frac{3}{4}$ — $3\frac{1}{4}$	46	32	$46\frac{1}{2}$	Considerably.
22	Bere	" 19	84	34 — 36	Medium	$2\frac{1}{2}$ — 3	45	40	48	Slightly,
23	Blue Long Head	" 24	89	36 — 38	"	$2\frac{1}{4}$ — $2\frac{3}{4}$	43	36	40	Considerably.
24	Chinese Hulless	" 27	92	28 — 30	Weak	2 — $2\frac{1}{2}$	43	36	58	"
25	Rennie's Improved	" 23	88	37 — 39	Stiff	$2\frac{1}{4}$ — $2\frac{3}{4}$	43	16	49	Slightly.
26	Empire*	" 24	89	39 — 41	"	$2\frac{1}{2}$ — 3	42	4	47	Considerably.
27	Norwegian	" 21	86	41 — 43	Weak	$2\frac{1}{2}$ — 3	42	4	$47\frac{1}{2}$	Slightly.
28	Eclipse	" 27	92	43 — 45	Stiff	$2\frac{3}{4}$ — $3\frac{1}{4}$	42	4	49	Considerably.
29	Champion (beardless)	" 19	84	45 — 47	"	3 — $3\frac{1}{2}$	40	..	39	Slightly.

Most Productive Varieties of Six-Row Barley.—Taking the average of the returns for the last five years, the varieties of six-row barley found to be the most productive at this Farm are Stella, Odessa, Nugent, Mensury and Blue Long Head.

Earliest Varieties of Six-Row Barley.—The differences in earliness to be observed among the varieties of six-row barley are not very striking. Among the earliest sorts are Odessa and Mensury.

Beardless Six-Row Barley.—The tests carried on at this farm indicate that Champion is the best variety of beardless barley that has been grown here. It ripens early but gives a poor yield and is not to be recommended.

Hulless Six-Row Barley.—The most productive variety of hulless barley which has been tested at this farm is Hulless Black. This is a bearded sort. It ripens early but has weak straw and gives a small yield.

TWO-ROW BARLEY.

Archer Chevalier is a strain of the well-known Chevalier barley. It was obtained from Ireland and was sown in the plots for the first time this year.

The plots of two-row barley were sown on April 25th, the seed being used at the rate of two bushels to the acre. The plots were one-fortieth of an acre. The soil varied from a light loam to a clay loam.

The yield per acre is expressed in 'bushels' of 48 pounds.

*Varieties produced at the Central Experimental Farm are marked with an asterisk.

TWO-ROW BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				Inches.		Inches.	Bush.	Lbs.	Lbs.	
1	Swan's Neck	July 22	88	38 to 40	Medium	2½ to 3	65	..	49½	Slightly.
2	Danish Chevalier	" 25	91	45 " 47	Stiff	3½ " 4	62	44	49	Considerably.
3	French Chevalier	" 25	91	44 " 46	"	3¼ " 3¾	60	..	51	Slightly.
4	Hannchen	" 24	90	33 " 35	"	3¼ " 3¾	58	16	50⅕	Considerably.
5	Fichtel Mountain	" 25	91	39 " 41	"	3½ " 4	56	12	50⅕	Slightly.
6	Standwell	" 27	93	37 " 39	"	2¾ " 3¼	54	8	49½	"
7	Bestehorn's Kaiser	" 31	97	41 " 43	Medium	2¾ " 3¼	53	36	48	"
8	Clifford*	" 26	92	47 " 49	Stiff	3¼ " 3¾	53	16	49½	"
9	Archer Chevalier	Aug. 1	98	34 " 36	Weak	3 " 3½	52	4	48	Considerably.
10	Swedish Chevalier	July 26	92	36 " 38	"	3 " 3½	50	40	47	Badly.
11	Harvey*	" 26	92	46 " 48	Medium	3½ " 4	50	..	50	Slightly.
12	Logan*	" 26	92	47 " 49	"	3¼ " 3¾	50	..	51	Considerably.
13	Primus	" 31	97	38 " 40	Stiff	2½ " 3	47	44	51	Slightly.
14	Beaver*	" 25	91	50 " 52	"	4 " 4½	47	24	49½	"
15	Jarvis*	" 25	91	50 " 52	"	4 " 4½	46	12	50¾	"
16	Princess	Aug. 1	98	35 " 37	Weak	3¼ " 3¾	45	20	46¾	Considerably.
17	Invincible	July 31	97	40 " 42	Medium	3 " 3½	45	..	48½	Slightly.
18	Maltster	" 31	97	40 " 42	Weak	3 " 3½	43	16	44½	Considerably.
19	Canadian Thorpe	" 31	97	41 " 43	Stiff	2¾ " 3¼	42	24	48½	Slightly.
20	Sidney*	" 27	93	44 " 46	"	3 " 3½	42	24	50	"
21	Princess Svalof	" 31	97	36 " 38	Weak	3 " 3½	42	24	45	Considerably.
22	Gordon*	" 27	93	45 " 47	Stiff	2½ " 3	41	12	49	"
23	Dunham*	" 27	93	44 " 46	"	3 " 3¾	40	40	49¼	"
24	Newton	" 31	97	39 " 41	Medium	2¾ " 3¼	33	16	49½	"
25	Brewer's Favourite	" 31	97	36 " 38	Stiff	3 " 3½	31	32	48	Slightly.

Most Productive Varieties of Two-row Barley.—Taking the average of the returns for the past five years, the varieties of two-row barley found to be the most productive at this Farm are: French Chevalier, Danish Chevalier and Canadian Thorpe. Other very productive sorts are Standwell, Beaver and Princess Svalof. The latter is, however, late in ripening.

Earliest Varieties of Two-row Barley.—The earliest variety among the more productive sorts tested for the past five years is Beaver. It ripens about two or three days before French Chevalier.

Beardless and Hulless Two-row Barley.—The varieties of beardless and hulless two-row barley which have been tested at this Farm are so deficient in strength of straw that it has not been thought necessary to grow them in the larger plots.

WINTER SIX-ROW BARLEY.

The variety of winter six-row barley known as Zero which was mentioned in the report for last year was tested again. A plot of one-fortieth of an acre was sown on September 8th, 1904. The soil was a clay loam. It made good growth in the autumn, stood the winter pretty well, and gave a fair yield of grain. It did not, however, produce nearly so large a crop as the best sorts of spring six-row barley, and did not ripen remarkably early. The date of ripening was July 22nd, and the yield per acre was 43 bushels 16 lbs.

PEAS.

The plots of peas were one-fortieth of an acre each. The soil was a sandy loam. The seed was sown on April 28th, at the rate of two or three bushels per acre, according to the size of the pea. A large crop was obtained.

Three varieties, Crown, Mummy and Paragon have been withdrawn from the plots, but will be re-introduced as soon as satisfactory strains of seed shall have been obtained.

The yield per acre is expressed in 'bushels' of 60 pounds.

PEAS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Yield per Acre.		Weight per measured bushel after cleaning.
					In.	In.	Bush.	Lbs.	Lbs.
1	White Wonder	Aug 8..	102	Medium	26–30	2 –2½	48	40	62
2	Gregory*	" 15..	109	Strong..	65–69	2½–3	41	40	62½
3	German White	" 9..	103	" ..	64–68	2 –2¼	41	20	63½
4	Canadian Beauty	" 10..	104	" ..	66–70	2¼–2¾	40	40	62
5	Golden Vine	" 10..	104	" ..	68–72	2 –2⅛	39	40	63
6	Picton*	" 12..	106	" ..	58–62	2¼–2½	39	..	63½
7	Agnes*	" 12..	106	" .	66–70	2½ 3	38	20	62½
8	Chancellor	" 12..	106	" ..	66–70	1¾–2¼	38	20	63
9	Victoria*	" 18..	112	" .	66–70	2¼–2¾	38	..	63¾
10	Pearl*	" 9..	103	" ..	64–68	2 –2½	37	20	62
11	Early Britain	" 15..	109	" ..	64–68	2 –2½	36	40	60½
12	Cooper*	" 10..	104	" ..	66–70	2¼–2¾	36	20	62
13	Prince*	" 9..	103	" ..	60–64	2¼–2¾	35	40	62
14	English Grey	" 16..	110	" ..	64–68	2 –2½	35	40	63¼
15	Duke*	" 15..	109	" ..	66–70	2¼–2¾	35	..	63
16	Mackay*	" 16..	110	" ..	64–68	2 –2½	34	..	63½
17	Prussian Blue	" 10..	104	" ..	62–66	2¼–2¾	34	..	63
18	Black-eye Marrowfat	" 18..	112	" ..	68–72	2¼–2¾	31	..	62½
19	Carleton*	" 15 .	109	" ..	68–72	2¼–2¾	30	..	63¾
20	Daniel O'Rourke	" 14..	108	" ..	70–74	1¾–2¼	29	40	64
21	Wisconsin Blue	" 10..	104	" ..	68–72	2 –2½	29	40	63½
22	White Marrowfat	" 15..	109	" ..	66–70	2¼ 2¾	29	..	63
23	Arthur*	" 7..	101	Medium	50–54	2 –2½	27	40	63
24	Macoun*	" 14..	108	Strong..	70–74	2 –2½	27	..	63½
25	Kent*	" 15..	109	" ..	70–74	2¼–2¾	27	..	62½
26	Prince Albert	" 15..	109	" ..	66–70	2¼ 2¾	25	20	61½
27	Archer*	" 16..	110	" ..	68–72	2 –2½	25	..	63
28	Field Grey	" 8..	112	" ..	68–72	1¾–2¼	24	40	63½
29	Nelson*	" 6..	100	Medium	47–51	2¼–2¾	22	40	62

* Varieties produced at the Central Experimental Farm are marked with an asterisk.

Most Productive Varieties of Peas.—Among the most productive sorts of peas grown for the past five years at this Farm are Golden Vine, Victoria, Mackay, White Wonder, Prince, Canadian Beauty and Prussian Blue.

Earliest Varieties of Peas.—Chancellor is perhaps the earliest ripening variety at this Farm. It ripens as a rule about four days before Golden Vine, and gives a good yield.

SPRING RYE.

One plot of spring rye (one-fortieth acre) was sown on April 26th, the seed being used at the rate of 1½ bushels to the acre. The soil was a clay loam. The grain was ripe August 1st (97 days). The straw was stiff, its length (including the head) being 56 to 58 inches. The heads were from 3 to 3½ inches long. The yield, expressed in 'bushels' of 56 lbs., was 40 bushels per acre; and the weight of the grain (after cleaning) was 56½ lbs. to the measured bushel.

WINTER RYE.

Four varieties of winter rye were sown on September 8th, 1904. The plots were one-fortieth of an acre, and the seed was used at the rate of 1½ bushels per acre. The soil was a clay loam. All the plots made good growth in the autumn, but in the spring the plots of Emerald and Giant were found to be rather badly winter-killed. These two varieties have been discontinued on account of their lack of hardiness.

The yield per acre is expressed in 'bushels' of 56 pounds.

WINTER RYE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.	Bush.	Lbs.	Lbs.	
1	Mammoth White	July 21	316	62-64	Stiff	4-4¾	36	4	56	Considerably.
2	Thousandfold	" 24	319	70-72	"	4-4½	35	20	57	"
3	Emerald	" 26	321	54-56	"	4-4½	28	12	56	"
4	Giant	" 27	322	54-56	"	4-4¾	28	12	56	"

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON SANDY LOAM.

These experiments were all conducted on plots of one-fortieth of an acre each. The wheat was sown April 29th and was ripe August 8th. The oats were sown April 29th and were ripe August 3rd. The barley was sown April 29th and was ripe July 22nd.

Though these tests have now been carried on for five years the results appear somewhat contradictory and do not yet permit the drawing of definite conclusions. The yields obtained this season are here given:—

Name of Variety.	Quantity Sown per Acre.	Number of Days from Sowing to Harvesting.	Yield per Acre.	
	Bush.		Bush.	Lbs.
Preston Wheat	1	101	32	20
"	1¼	101	31	20
"	1½	101	25	..
"	2	101	28	40
"	2½	101	26	40
"	3	101	27	..
Banner Oats	1½	96	45	30
"	2	96	72	12
"	2½	96	56	16
"	3	96	64	24
"	3½	96	77	2
"	4	96	64	24
Mensury Barley	1½	84	32	24
"	2	84	37	44
"	2½	84	28	36
"	3	84	35	20
"	3½	84	53	36
"	4	84	50	..

GRAIN SOWN IN DIFFERENT QUANTITIES PER ACRE ON CLAY LOAM.

These experiments were all conducted on plots of one-fortieth of an acre each. The wheat was sown April 28th and was ripe August 7th. The oats were sown April 28th and were ripe August 2nd. The barley was sown April 28th and was ripe July 22nd.

The results obtained this season are here given:—

Name of Variety.	Quantity Sown per Acre.	Number of Days from Sowing to Harvesting.	Yield per Acre.	
	Bush.		Bush.	Lbs.
Preston Wheat	1	101	25	..
"	1¼	101	32	..
"	1½	101	29	20
"	2	101	30	20
"	2½	101	32	..
"	3	101	30	40
Banner Oats	1½	96	80	20
"	2	96	82	12
"	2½	96	70	20
"	3	96	69	14
"	3½	96	75	10
"	4	96	83	18
Mensury Barley	1½	85	62	24
"	2	85	56	32
"	2½	85	46	32
"	3	85	37	4
"	3½	85	49	8
"	4	85	53	36



Photo. by C. E. Saunders.

6 and 7 are unusual Heads of Red Fife, (Actual Size.)
8 is a typical Head of White Russian, (Actual Size.)
9 is a small Head of White Russian (Easily mistaken for Red Fife).

Taking the average results for the five years during which these experiments have been carried on we find that the best quantity of Preston wheat to sow on clay loam is 1½ bushels to the acre, either a smaller or a larger amount of seed giving a reduced yield.

1¼ bushels per acre gave an average yield of 27 bushels 44 lbs. per acre.
1½ bushels per acre gave an average yield of 28 bushels 48 lbs. per acre.
2 bushels per acre gave an average yield of 27 bushels per acre.

The other quantities of seed used also gave smaller returns than were obtained from 1½ bushels.

The results with Banner oats do not form a regular series and it is evident that further tests must be made.

While the average returns for Mensury barley are not free from irregularities they permit definite conclusions to be drawn. About two bushels per acre is the best quantity to sow on clay loam.

1½ bushels per acre gave an average yield of 53 bushels 19 lbs. per acre.
2 bushels per acre gave an average yield of 54 bushels 39 lbs. per acre.

The larger quantities of seed sown gave somewhat smaller returns than those obtained from 2 bushels per acre. In addition to the reduced yield the extra cost of the larger amounts of seed must also be considered.

PLOTS OF MIXED GRAIN.

In choosing the varieties for these plots the greatest care is exercised to sow together only such sorts as are known to mature in almost the same number of days, so that they may both be ready for cutting at the same time. Only one column is given for the number of days maturing, as in every case the mixtures ripened with great uniformity.

The plots were one-fortieth of an acre and the seed was sown on April 26th. Wheat was used at the rate of 60 lbs. per acre, oats 40 lbs. per acre, barley 50 lbs. per acre, and emmer 70 lbs. per acre. The soil was a clay loam.

Varieties.	Date of Ripening.	No. of Days Maturing.	Yield per Acre.	Proportions in Crop Harvested.
			Lbs.	
Wheat and Oats—				
Pringle's Champlain wheat and American Triumph oats	Aug. 1..	97	2,580	37 per cent wheat = 955 lbs. per acre. 63 " oats = 1,625 "
Preston wheat and White Giant oats	" 1..	97	2,500	39 " wheat = 975 " 61 " oats = 1,525 "
Wheat and Two-row Barley—				
Gehun wheat and French Chevalier barley	July 29..	94	2,060	40 " wheat = 824 " 60 " barley = 1,236 "
Oats and Two-row Barley—				
American Beauty oats and Princess Svalof barley	" 30..	95	2,740	53 " oats = 1,452 " 47 " barley = 1,288 "
Welcome oats and French Chevalier barley	" 30..	95	2,560	42 " oats = 1,075 " 58 " barley = 1,485 "
Oats and Emmer—				
Banner oats and common emmer	Aug. 2..	98	2,560	76 " oats = 1,946 " 24 " emmer = 614 "

SOJA BEANS.

Two plots of the common soja bean were sown on May 25th and were cut on October 6th. The size of the plots was one-fortieth of an acre. The soil was a sandy loam. As the beans did not ripen the weight of green crop only was determined.

Plot 1.—Sown in rows 21 inches apart; growth strong and even, leafy; average height 43 to 45 inches; total yield of green crop 9 tons 1,600 lbs. per acre.

Plot 2.—Sown in rows 28 inches apart; growth strong and even, leafy; average height 45 to 47 inches; stalks considerably stiffer than in plot 1; total yield of green crop 10 tons 800 lbs. per acre.

The returns this year agree with those of previous years, showing a decided advantage in sowing the beans in rows 28 inches apart rather than 21. Taking the average of the results for the past five years the plots in which the rows of beans were 28 inches apart gave a yield of 11 tons 1,000 lbs. per acre, while those in which the rows were 21 inches apart gave 10 tons 744 lbs.

FIELD BEANS.

Four plots of field beans, one-fortieth of an acre each, were sown on May 26th. The soil was a loam of good quality.

The yield per acre is expressed in 'bushels' of 60 lbs.

FIELD BEANS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Pod.	Yield per Acre.	Weight per Measured Bushel after Cleaning.
				Inches.	Inches.	Bus. Lbs.	Lbs.
1	California Pea Bean	Sept. 12	109	18–22	3½–4	42 20	64¾
2	White Field	" 21	118	20–24	4 –4½	32 20	64
3	Marrowfat	" 23	120	24–28	3¾–4¼	27 20	63
4	Norwegian Brown	Aug. 29	95	9–13	4¼- 4¾	27 ..	60¼

FLAX.

The plots of flax were one-fortieth of an acre. The seed was sown on May 25th, at the rate of 60 lbs. to the acre. The soil was a loam of good quality. The yield per acre is expressed in 'bushels' of 56 lbs.

FLAX—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Plants.	Weight of Seed per Measured Bushel.	Yield per Acre.
				Inches.	Lbs.	Bush. Lbs.
1	Riga	Aug. 18	85	31–33	54	10 40
2	Russian	" 17	84	35–37	53	9 30
3	Novarossick	" 29	96	32–34	52	9 10
4	White Flowering	" 18	85	31–33	54¼	8 ..
5	Yellow Seed	" 22	89	34–36	52	7 10
6	Common	" 18	85	34–36	53½	4 20
7	La Plata	" 31	98	31–33	52	4 ..

MILLET.

The plots of millet were one-fortieth of an acre. The soil was a good rich loam. The seed was sown with a hand seed drill on May 12th. The plots were cut when the seed was in the doughy state.

MILLET—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Cutting.	Length of Straw.	Character of Growth.	Weight per Acre, Green.	Weight per Acre, Dry.
			Inches.		Tons. Lbs.	Tons. Lbs.
1	Italian or Indian.....	Aug. 19..	59–63	Strong....	14 1,840	6 1,360
2	Pearl or Cat-tail	" 19..	50–54	" . ..	14 160	8 1,040
3	African.....	" 19..	70–74	"	13 480	7 1,120
4	Green Californian	" 19..	43–47	"	11 ..	6 240
5	White Round French.....	" 19..	60–64	"	10 1,280	5 1,200
6	Moha Hungarian.....	" 19..	48–52	"	8 1,200	4 1,680

FIELD ROOTS.

The advantage of late pulling for field roots having been clearly proved by the experience of several years, comparative tests, by pulling on two different dates about two weeks apart, were discontinued this season. All the roots were harvested at the one time, but the harvesting was left until quite late so as to enable the roots to make as large a growth as possible.

The yield per acre of the field roots is calculated from the weight of the crop gathered from one-hundredth of an acre.

The soil on which the field roots were grown was a good rich loam.

It is probable that in some instances varieties which are mentioned in these tables under different names are identical in all essential respects.

In Canada the ton contains 2,000 pounds.

TURNIPS.

Two sowings were made of each variety, the first on May 10th and the second on May 23rd. The seed was used at the rate of about four pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows.

The roots were pulled on October 25th.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre from 1st Sowing.		Yield per Acre from 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Perfection Swede	36	500	19	400
2	New Century	34	1,900	19	1,200
3	Jumbo	34	1,100	18	100
4	Kangaroo	34	800	20	200
5	Mammoth Clyde	33	1,700	16	1,500
6	Emperor Swede	32	1,400	15	1,300
7	Hartley's Bronze	32	1,300	17	1,600
8	Sutton's Champion	31	1,400	17	300
9	Magnum Bonum	31	500	23	1,500
10	Selected Purple Top	30	1,900	14	1,200
11	Carter's Elephant	30	1,600	15	700
12	Good Luck.	29	1,700	16	100
13	Elephant's Master	29	1,000	11	300
14	Halewood's Bronze Top	29	600	14	600
15	Skirvings	28	1,700	11	100
16	East Lothian	27	1,300	13	900
17	Hall's Westbury	27	1,100	14	600
18	Bangholm Selected	26	1,100	10	1,700
19	Drummond Purple Top	24	400	13	..
20	Imperial Swede	23	200	16	750

The average yield from the 1st sowing was 30 tons 1,060 lbs. per acre.
The average yield from the 2nd sowing was 15 tons 1,852 lbs. per acre.

MANGELS.

Two sowings were made of each variety, the first on May 10th, and the second on May 23rd. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about seven inches apart in the rows. The roots were pulled October 25th.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st sowing.		Yield per acre from 2nd sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Half Long Sugar White	52	600	32	800
2	Prize Mammoth Long Red	46	700	25	1,500
3	Mammoth Yellow Intermediate	45	950	27	..
4	Prize Winner Yellow Globe	45	200	30	1,100
5	Leviathan Long Red	40	1,400	25	300
6	Giant Yellow Intermediate	40	1,250	24	1,600
7	Giant Sugar Mangel	40	900	26	300
8	Lion Yellow Intermediate	39	600	23	800
9	Ideal	37	900	29	600
10	Giant Yellow Globe	37	800	27	700
11	Selected Yellow Globe	37	800	21	1,400
12	Mammoth Long Red	37	700	23	800
13	Half Long Sugar Rosy	36	....	22	1,950
14	Yellow Intermediate	35	1,300	27	400
15	Gate Post.	35	....	31	....
16	Triumph Yellow Globe	29	500	28	1,500
17	Selected Mammoth Long Red	28	1,200	16	1,800

The average yield from the 1st sowing was 39 tons 165 lbs. per acre.
The average yield from the 2nd sowing was 26 tons 29 lbs. per acre.

CARROTS.

Two sowings were made of each variety, the first on May 10th, and the second on May 23rd. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled October 25th.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st sowing.		Yield per acre from 2nd sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Mammoth White Intermediate	32	500	19	300
2	Improved Short White	30	1,700	19	1,300
3	New White Intermediate	30	1,600	21	1,400
4	Giant White Vosges	30	600	17	1,000
5	Ontario Champion	28	1,000	21	500
6	Carter's Orange Giant	24	600	20	600
7	Early Gem	23	1,200	23	300
8	White Belgian	21	1,100	18	300
9	Long Yellow Stump Rooted	21	600	18	500
10	Kos Kirsches	19	1,600	13	600
11	Half Long Chantenay	14	200	11	1,300

The average yield from the 1st sowing was 25 tons 427 lbs. per acre.
The average yield from the 2nd sowing was 18 tons 1,100 lbs. per acre.

SUGAR BEETS.

Two sowings were made of each variety, the first on May 10th, and the second on May 23rd. The seed was used at the rate of about six pounds per acre. Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller to make a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about five inches apart in the rows. The roots were pulled on October 25th.

Though all the varieties mentioned here are commonly classed as sugar beets, it should be noted that the only ones recommended for use in the manufacture of sugar are Wanzleben, French Very Rich, and Vilmorin's Improved.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per acre from 1st sowing.		Yield per acre from 2nd sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Danish Red Top	40	1,300	25	200
2	Danish Improved	38	1,900	25	1,500
3	Red Top Sugar	36	900	17	1,300
4	Improved Imperial	32	1,600	20	600
5	Royal Giant	29	600	24	1,500
6	French Very Rich	29	....	17	300
7	Vilmorin's Improved	26	900	15	1,500
8	Wanzleben	25	600	14	400

The average yield from the 1st sowing was 32 tons 725 lbs. per acre.
The average yield from the 2nd sowing was 20 tons 162 lbs. per acre.

INDIAN CORN.

The corn was sown with the seed drill in rows thirty-five inches apart, and was also sown in hills thirty-five inches apart each way. When the plants were about six inches high they were thinned out, leaving them from six to eight inches apart in the rows, and leaving four or five plants in each hill. The seed was sown May 22nd, and the corn was cut green for ensilage September 11th. The yield has been calculated from the weight of crop cut from two rows, each 66 feet long. The soil was a rather heavy loam.

For the making of ensilage the corn should be cut when the kernels are in the late milk or doughy stage; but the summer at Ottawa is not always warm enough to bring the later varieties to this state of maturity before it is necessary to cut the crop to avoid frost.

In Canada the ton contains 2,000 pounds.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
			Inches.			Tons.	Lbs.	Tons.	Lbs.
1	Eureka	Very strong.	115 to 120	Leafy	Early milk.	37	1,130	36	380
2	Pride of the North	Strong	100 " 105	Very leafy	"	33	1,650	31	700
3	Thoroughbred White Flint	"	100 " 105	"	"	33	880	35	180
4	Red Cob Ensilage	Very strong.	125 " 130	Medium	"	32	1,450	27	560
5	Cloud's Early Yellow	Strong	105 " 110	"	Late milk.	32	1,340	27	340
6	Superior Fodder	"	115 " 120	Very leafy	No cobs.	32	900	33	1,100
7	Wood's Northern Dent	"	110 " 115	"	Early milk.	31	1,360	29	1,950
8	Longfellow	"	80 " 85	Leafy	Late milk.	31	920	24	730
9	Selected Leaming	"	115 " 120	Very leafy	Early milk.	31	700	26	1,900
10	King Philip	Medium	100 " 105	"	"	30	940	27	1,330
11	Early Mastodon	Strong	105 " 110	"	"	30	60	26	1,020
12	Giant Prolific Ensilage	"	110 " 115	"	No cobs.	29	1,620	26	1,900
13	Salzer's All Gold	"	105 " 110	"	"	29	1,620	31	1,800
14	Evergreen Sugar	Medium	95 " 100	Leafy	Late milk.	29	520	29	300
15	Early Butler	Very strong.	110 " 115	"	Early milk.	28	1,750	29	1,620
16	Compton's Early	Strong	80 " 85	"	Late milk.	28	1,310	25	710
17	Champion White Pearl	Very strong.	110 " 115	Medium	Early milk.	27	1,880	24	460
18	Angel of Midnight	Medium	95 " 100	Very leafy	Early milk.	27	450	26	360
19	White Cap Yellow Dent	Strong	100 " 105	"	"	27	450	27	780
20	Mammoth Cuban	"	105 " 110	Leafy	"	26	1,900	27	1,550
21	North Dakota White	Medium	94 " 100	Very leafy	"	26	1,900	26	30

The average yield from the rows was 30 tons 987 lbs. per acre.
The average yield from the hills was 28 tons 1,221 lbs. per acre.

INDIAN CORN SOWN AT DIFFERENT DISTANCES.

Three varieties were chosen for this test: Champion White Pearl, Selected Leaming, and Longfellow. The seed was sown May 22nd, and the corn was cut for ensilage September 11th. Sixteen rows of each variety were sown, that is, four rows at each of the distances mentioned, and the yield per acre has been calculated from the weight of crop obtained from the two inner rows in each case. The length of the portions of the rows cut for weighing was 66 feet.

Name of Variety.	Distance between the Rows.	Character of Growth.	Height when Cut.	Condition when Cut.	Yield per Acre.	
	In.		In.		Tons.	Lbs.
Selected Leaming	21	Very strong.	95—100	Early milk.	30	1,992
"	28	"	100—105	"	32	1,706
"	35	"	100—105	"	27	1,660
"	42	"	100—105	"	30	912
Champion White Pearl	21	"	110—115	"	29	590
" "	28	"	115—120	"	30	66
" "	35	"	115—120	"	32	900
" "	42	"	115—120	"	29	280
Longfellow	21	Medium	90— 95	Late milk	26	1,676
"	28	"	95—100	"	24	504
"	35	"	95—100	"	27	340
"	42	"	95—100	"	27	1,736

FIELD PLOTS OF POTATOES.

As the experimental plots of field roots and fodder corn do not occupy the whole of the field in which they are placed, the remaining space is usually filled with potatoes, such varieties being grown as are likely to be of service in the annual distribution of samples from this Farm.

The area devoted to the different varieties varies considerably. This season the plots were from about one-quarter to three-quarters of an acre in size.

The potatoes were planted May 15th, and were dug September 29th.

In spite of repeated sprayings with Bordeaux mixture, those varieties which were grown in rather heavy soil were considerably affected by rot. The varieties grown in rather light soil were not much affected.

The yield per acre is expressed in 'bushels' of 60 lbs., and includes only the sound potatoes.

Number.	Varieties Grown in rather Light Soil.	Yield per Acre.
		Bushels.
1	Dr. Mærker	274
2	Early White Prize	241
3	Money Maker	225
4	Everett	217
5	Reeve's Rose	207
6	Rochester Rose	206
7	Burnaby Mammoth	182
8	Canadian Beauty	157
9	Late Puritan	140

Number.	Varieties Grown in rather Heavy Soil.	Yield per Acre.
		Bushels.
1	Swiss Snow Flake.	202
2	Uncle Sam	166
3	American Wonder	162
4	Bovee	149
5	Carman No. 1	145
6	Vick's Extra Early	143
7	State of Maine	94

REPORT OF THE POULTRY MANAGER.

(A. G. GILBERT.)

OTTAWA, December 1, 1905.

To Dr. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have great pleasure in submitting to you the eighteenth annual report of the Poultry Division of the Central Experimental Farm.

Whether discussing some of the more recent phases of poultry development or giving detailed account of the experimental work carried on during the past year, there was always the intention of conveying to the farmers of the country and others interested such information as would be found of practical benefit to them.

With this object in view the first portion of the report is devoted to the consideration of certain changes which have lately taken place in the home market, the requirements of which, while they have become more exacting, have also become more valuable.

A number of extracts are quoted from letters written by farmers who not only show in these quotations large margins of profit made by them in catering, with poultry products of the best quality, to the more exacting demands referred to; but also describe their methods of management and the rations used by them in bringing about these profitable results.

The second part of the report gives detailed account of the experimental work of the year which, for the most part, was carried on under the immediate supervision of my assistant, Mr. Victor Fortier. To his careful and systematic recording of the *data* relating to the different experiments in combination with a thorough knowledge of the details of poultry breeding, much of the interesting experience gained is to be attributed.

I have pleasure in acknowledging the attention and correctness shown by Mr. Summers in securing results of the trap test, and other experiments entrusted to his care. Mr. George Deavey has been active and regular in the performance of the work allotted to him.

During the latter part of the season a small poultry house of new pattern with scratching shed attachment was erected and will be used in promoting the work of building up hardy and prolific winter egg laying strains of fowls.

Addresses were given by the writer during the year at different points throughout the country.

Mr. Fortier addressed meetings, or attended poultry shows at St. Therése, Cowansville, St. Hyacinthe, Three Rivers, Quebec City, Rivière du Loup and St. Justin, in the province of Quebec, and Ottawa, later in the year.

An exceedingly useful and instructive exhibition was made by our Division at the Central Canada Exhibition held during the second and third weeks of the month of September last. The display showed the methods adopted and appliances used in the prosecution of the work of our department as well as a number of birds of very fine type and quality, which received much appreciative comment.

The letters received during the year numbered 2,993, and those sent away, 3,043. Besides a large number of reports were despatched in response to requests for them.

For further particulars relating to the work of the past year, I beg to refer you to the following report.

I have the honour to be, sir,

Your obedient servant,

A. G. GILBERT.

REPORT OF THE POULTRY DIVISION.

There are certain features in connection with the work carried on by this Division during the past year that warrant more than passing notice. A brief discussion of these features, which not only mark distinct advance in the poultry branch of farm work but directly affect the production and consumption of poultry and eggs, will doubtless be of interest to producers, purveyors and consumers.. Among the subjects considered are:

1. Continued high prices for midsummer eggs, but which must be strictly new laid.
2. Decreased exports notwithstanding increased production.
3. Has the cost of production kept pace with increased prices?
5. Is the home production of the better quality of poultry and eggs equal to our local demands?
6. Some difficulties in the way of placing strictly new laid eggs and the desirable type of chickens on the market.
7. Letters from farmers showing large margins of profit made by the sale of reliable eggs and the superior quality of poultry.

A marked feature of the year was the greatly increased demand from all parts of the country, but chiefly from farmers, for information as to the most suitable breeds of poultry and their proper management, and for the fowls themselves for laying, market or breeding purposes, far beyond the capacity of our department to supply.

While these are all gratifying instances of growing interest in this branch of farm work, that there is great room for further development is proved by the fact that the supply of the better quality of poultry and eggs is yet far short of the demands of the home and British markets. Another sign of the rapidly growing value of our home market is the continued high value of eggs laid in the midsummer months. To find a reason for these high prices is the subject of much speculation among those who cannot see why summer eggs should be worth more now than heretofore.

CAUSES OF THE HIGH PRICE OF SUMMER EGGS.

One likely reason for the continued high price of midsummer eggs was said in report of last year, 1904, to be the more general practice on the part of farmers and poultry fanciers of having their fowls moult in summer. As the moulting period is one of comparative non-production and usually occupies from 8 to 10 weeks, its effect on the heretofore large midsummer egg supply, will readily be appreciated. More recent investigation shows another likely cause for the midsummer shortage of eggs to be the practice on the part of dealers or their agents of purchasing during the summer months from farmers or village storekeepers large numbers of eggs for the purpose of preservation in cold storage or by other means.

These eggs are purchased at the lowest price and held over for sale in the city markets when values are at their highest.

WHY SHOULD EXPORTS OF POULTRY AND EGGS DECREASE IN THE FACE OF INCREASED PRODUCTION?

As compared with the exports of poultry and eggs for the year 1904, amounting to $1,250,197, those of the succeeding year 1905, valued at $858,289, show a considerable falling off. The first inclination on reading these figures would be to attribute the decline in value to a lessened demand on the part of the English consumers. But the reverse is actually the case, for Canadian poultry and eggs were never in greater request or better repute than they are at present. What then is the cause of the decrease in the export value of these articles? This question is frequently asked. There is an explanation therefor. Close observation of and experience in the different phases of poultry and egg production suggest the following influences as likely to have brought about the present state of affairs, viz.:—

1. Increased home consumption with increased prices.
2. The higher price of meat which has resulted in a greater consumption of eggs.
3. A greater and growing appreciation of the better class of poultry and eggs which can only come from carefully reared chickens and cleanly fed hens.
4. The extra care and effort required in obtaining the 'selected' article, which as a result is calculated to be in lesser than greater supply.
5. A popular opinion that there is less waste in a dozen eggs even at advanced prices than there is in meat of the same value.
6. The convenience and despatch with which eggs may be prepared as food under many varied conditions.

HAS THE COST OF PRODUCTION INCREASED WITH ENHANCED VALUES?

This is another question that frequently occurs in connection with the increased values of poultry and eggs. In reply it may be said that experience tends to show that there should be lessened rather than increased cost of production to the different classes of producers, who are acquainted with up to date poultry management and in this way:—

To the farmers of the country in the more general use of many forms of waste, convenient to them, and which hitherto may have been unthought of or neglected factors as applied to poultry keeping. Among these forms of waste may be classed refuse of table and kitchen; unmarketable roots or vegetables; small grains which may be ground up and made into mash; chaff or short straw or hay, which can be used for litter or scratching material on the floor of the pens, heads, livers or other forms of meat waste; skimmed milk, curd, whey, &c., which can be used to good purpose in the fleshing of chickens and in egg production; and farmers have their grain at cost.

To specialists and other poultrymen, many of the aforementioned forms of waste will doubtless be available, as well as numerous preparations of meat, meals and clover —the by-products of farm, factory and packing house. These and other preparations of grit, and broken oyster shells are put up in convenient packages and sold at reasonable prices by poultry supply houses, or their agents throughout the country.

Until recent years the use of these essentials was little understood nor were they easy to procure, but the development of poultry keeping created a demand for them and in response the supply came.

The better appreciation and more general use of these varied forms of waste and by-products—so long as the latter are cheap and effective—should tend to prevent an increase in the cost of production, if not to actually lessen it.

HAS THE PRODUCTION OF THE BETTER QUALITY OF POULTRY AND EGGS KEPT PACE WITH THE HOME DEMAND?

This is a question that is the subject of much interesting speculation. It is one that presents itself in connection with the growing value of the home market for the

better quality of poultry and eggs. Increasing prices show that the supply is yet short of the demand. There can be no doubt that the home requirement for both these products is far greater to-day than ever before and equally true is it that the taste of our home consumers for the better quality was never more exacting than it is to-day. This is instanced in the increased demand in summer for the 'strictly new laid egg' with the flavour peculiar to it. The leading purveyors of the cities do not hesitate to say that their customers are no longer content with the vague assurance 'that the eggs are probably fresh.' If after they are bought the eggs turn out to be bad the seller is sure to hear about it. So the city or town grocers, like their customers, become more exacting, and the farmers or collectors in turn have to be more cautious as to the freshness of the eggs and quality of the poultry they sell.

Perhaps the exacting nature of these demands is a cause for the apparent difficulty in meeting them. It has already been remarked that 'increased care and effort' are required to produce the 'selected' article. This at once means higher value for the greater labour expended. Certain it is that these are causes for the comparatively slow response on part of producers to remunerative margins of profit. These profits are shown in a later page by the farmers who made them by catering to the 'exacting' demands referred to with high class products. Long experience has shown that there are certain conditions which govern the production of the high priced article. These conditions must be unflinchingly observed by farmer, amateur, or professional manager of a poultry plant before they can place the 'selected' or 'guaranteed' eggs and plump chickens—which will bring the highest prices—into the hands of leading city purveyor or private customers. These conditions are named as follows:

CONDITIONS TO BE OBSERVED IN THE PRODUCTION OF 'SELECTED' EGGS AND POULTRY.

SUMMER EGGS of undoubted freshness and flavour must be—

(*a*) Strictly new laid when sent to city dealer or sold to private customer.

(*b*) They should reach the consumer within one week of being laid.

(*c*) Non-fertilized.

(*d*) After being taken from nests—until shipped or sold—should be kept in a sweet smelling cellar or cupboard.

WINTER EGGS—

(*a*) Should be collected before being frozen.

(*b*) Sent to city dealer, customer or sold on market within ten days of laying.

(*c*) Kept meanwhile in clean, sweet smelling storing place.

(*d*) Preferably non-fertilized, but this is not so strictly insisted on as in the case of summer eggs, for in winter there is not the same risk of germ development.

EGGS OF BOTH SEASONS.—In order to have the desirable flavour at all seasons eggs should come from cleanly fed and kept hens. The fowls should not have access to decaying animal, or, vegetable matter. This particularly applies to summer. The nests at all times should be clean, comfortable and free from lice. The largest eggs will be laid by hens. Pullets may yield a greater number but their eggs will be found to be of smaller size. Whether laid by hens or pullets the eggs to be of large size and good quality must come from generously fed birds.

POULTRY OF BEST QUALITY.—To have chickens of the desirable type and quality they require to be:—

(*a*) Of correct market type. This is brought about by breeding from parent stock of like type.

(*b*) They should be carefully housed and regularly fed from time of hatching until saleable age.

(*c*) They should not be expected to 'pick up all their own living.' This practice is too common. Chickens so treated or in any other way neglected are not likely to make good market specimens, breeding stock or show birds.

(*d*) Chickens, their coops and colony houses should be kept free from lice. Lice-infested chickens do not thrive.

(*e*) A thriving chicken should be a hearty eater, an industrious forager and quick grower.

The faithful observance of the foregoing conditions is likely to be followed by the best results in the rearing of the better class of table poultry and the obtaining of reliable eggs. The proper food and treatment for chickens will be found in a following page.

APPRECIATION OF THE BETTER QUALITY.

Farmers and others who contemplate going into poultry and egg production will find it to their advantage to correctly size up the requirements of the present day markets. They should, from the outset, make it a rule to produce none but the best quality of poultry and eggs. That the better quality receives the highest price is shown in the following letters from farmers, their wives or daughters:—

PETROLEA, November 20, 1905.

DEAR SIR,—I am offered by Mr. Gatehouse, of Dorchester street, Montreal, to whom you referred me, the following prices:

Eight to 10 cents per lb. for ordinary farm chickens; 10 to 14 cents per lb. for fattened chickens *according to quality.*

Fresh eggs 40 cents per dozen, with the prospects of an advance in a few days. I received his letter a week ago (November 13).

The poultry prices I did not consider high enough to tempt me to ship. Eggs at prices named would pay me well. As a result I may keep one hundred pure bred hens. Those I have are mixed.—HATTIE E. S.———.

In reply, the above correspondent was advised to carry out her intention of keeping none but pure bred Plymouth Rocks, which would not only give her eggs, but chickens of the most acceptable market types. In this way she would have opportunity to receive the highest values for both articles.

The following is an instance where the best quality poultry, properly plucked and dressed, received the highest prices:

MYRTLE, ONT., October 23, 1905.

DEAR SIR,—We sent our poultry to Mr. H. Gatehouse, Dorchester street, Montreal, and received the following prices for them: Barred Plymouth Rock cockerels (dressed) 15 cents per lb. Ducks—Pekin and Rouen—of large size and good quality, 16 cents per lb.

It cost one cent per lb. for express charges to Montreal. The cockerels were dressed in the same manner as were the poultry shown by the Central Experimental Farm at the Central Canada Exhibition in Ottawa last month (September). They were plucked but not drawn, with feathers on wing tips, and their heads placed under their wings. We send all our poultry to Mr. Gatehouse.—(Sgd.) MRS. F. LEA.

The following is another instance of the better quality receiving best prices:

ELMHURST, RAMSAY, November 14, 1905.

DEAR SIR,—In July last I sold April hatched chickens at 20 cents per lb. In August the May chicks at 16 cents per lb. Live weight in both cases. Up to this date I have sold 90 cockerels.—MRS. JOS. YUILL.

MARGINS OF PROFIT MADE BY FARMERS. INSTANCES OF SUCCESSFUL MANAGEMENT.

The question as to possible margins of profit in poultry keeping is frequently asked. For many years past it has been the contention of enthusiastic advocates of

poultry culture that, when properly managed, no branch of farm work should pay a better margin of profit. In reports of this department for many years past it has been held that, by obtaining eggs in winter and selling them at city prices, in combination with the rearing of the best types of market chickens in early summer, a margin of from one to two hundred per cent profit should be made by farmers, according to their near location to or distance from a city market. That these calculations, made after long experience, were not over-estimated is shown by the following instances of successful poultry management, and related by farmers over their own signatures, in leading agricultural papers of recent date. These statements are doubly valuable for they not only show large margins of profit, but the methods of feeding and management whereby they were made:—

STATEMENT 1.—Made by Mr. J. R. Henry, of Wentworth County, in *Farmers' Advocate* of March 9, 1905: 'Have had eggs all fall and winter in good supply. Have kept account, and have sold more than $2 worth of eggs for every $1 worth of feed consumed. And in growing early chicks for market, have made $3 for $1 cost. I find I can raise chicks to eight weeks for $8 per hundred, and make them ready for market. Yes, my hens pay and pay well.

'In feeding, I try to follow, in part, Ottawa Experimental Farm teachings. Morning, first thing, a little tasty mash, but not more than a pint to twenty-five hens. Then stir up the litter, and scatter a half pint of screenings; this again at noon. Open up the windows and doors, unless storm beats in. During day, clover leaves in trough, also apples and apple peelings. I like to hang cabbage and mangels for them to pick at high enough that they have to reach or jump for them. I think it best to feed the green bone or other animal food about two hours before sundown each day, about one-half ounce to each hen. Then give a final feed of grain in the straw, about two quarts to twenty-five hens. Then, at sundown give a mash composed of cooked potatoes and peelings, with any kitchen scraps, with chop and shorts stirred in until stiff—all they will eat. Water, grit and oyster-shell at will. I think wheat the best all-round grain, if we were compelled to use only one kind. Always, when wheat is high, eggs are dear also, so we can draw a safe conclusion.'

STATEMENT No. 2.—By Mr. J. F. Riddle, of Norfolk Co., Ont., in the *Farmers' Advocate* of March 2, 1905, and which shows a large margin of profit from his hens and his manner of feeding them, viz.:—

'In the year 1903 I kept 40 females (Barred Plymouth Rocks) and they netted me $34 over and above the feed bill. In 1902 my sales amounted to $101.40, with net profit of $43.36. In 1901 receipts were $103.50, my profit being $52, but I cannot say how many I kept these two years.

'I have always fed a variety of grains—wheat and buckwheat forming the principal part—with very little corn or oats. I give one or two messes of cooked vegetables, mixed with shorts, each week, with cabbage or mangolds for a change. They get green-cut bone or liver two or three times a week; also clover leaves, either dry or in the mash. They get a warm mash nearly every day, either night and morning. I strive to keep them busy and contented the whole day long.

STATEMENT No. 3.—By Mr. E. C. Parker, Compton, Que., March 16, 1905.—An estimate of the profit to be made from selling eggs during the summer and winter months may fairly be had by calculating that it costs during summer 5 cents to produce a dozen eggs, which sell for 16 cents, a moderate value at that season. Allowing that it costs twice as much to produce a dozen eggs in winter, when they sell in Montreal at 35 to 50 cents per dozen, as I show later on, we still have a profit of from 25 to 35 cents per dozen. From 100 April and May hatched White Wyandottes (50 of each), I got $14.30 worth of eggs in November, 1903. In December of same year they laid 1,141 eggs. In January, 1904, they laid 1,385, about 115 dozen. In February they laid 1,393 eggs. The prices received per dozen were: Novem-

ber, 40c.; December, 50c.; January, first two weeks, 45c., last two weeks, 40c.; February, 40c. for the first three weeks, 35c. for the last week. The total amount received by me from Mr. Graham, of Montreal, was $149.41. This record is to March 1. My methods of management are and have been as follows:—By selecting the best I have now no poor egg layers. I keep 6 to 8 inches of straw on the floors of the pens, and change it about once per week. The whole grain is fed in the litter during the winter. Rations are:—

Morning (early).—Cracked corn.

About 11 a.m.—Mangels or cabbages.

Noon.—Wheat.

P.M. ration.—Mash composed of second crop clover hay (cut), bran, middlings, ground oats, cornmeal and a small part of meat meal.

Any spare skimmed milk is also given to the fowls. I am a great believer in fresh air, and my houses are open every fine day during winter, and as a result they are always dry, and I have few cases of sickness. I do not believe that hens kept in the manner outlined, and if of a good egg-laying strain, get too fat to lay, so I feed them all they will eat up clean. I never could get hens to lay well unless they were fat and well fed.'

The last statement is most important, as the experience gained in our department in the winter feeding of the laying stock in cold quarters leads to the same conclusion.

STATEMENT No. 4.—By Mrs. Joseph Yuill, of Ramsay, Ont., near Carleton Place. 'I never had such good results from my fowls as I have had during the past year. I have cleared $17 per month from 35 hens from December 1, 1904, to end of March last. This from eggs only.'

STATEMENT No. 5—By Mr. John Nadeau, East Montmorenci, Que.: 'Last fall I began with 15 hens of different kinds. They were put into a poultry house 15 x 17, with a scratching shed attached 10 x 18. I fed as follows :—

'Morning Ration.—Warm mash composed of bran, ground oats and ground barley.

'Noon.—Oats and barley mixed. Sometimes buckwheat or wheat replaced the barley. This was thrown into the litter on the floor of the scratching shed to cause the hens to search for it.

Afternoon.—Oats and barley, or wheat or buckwheat mixed in lieu of the latter. This was always thrown into the litter. Every effort was made to keep the fowls busy.

'On May 2 last, I set three hens (old) on 39 eggs, and from them received 32 strong and vigorous chickens. I attribute the fertility of the eggs and the strength of the germs to the exercise, fresh air and plenty of room.

'Between the fall of last year and October 2 of this year (1905), I sold eggs and chickens which made me $26.79 above all expenses. This may seem a small amount of profit, but I have on hand 44 hens and a cockerel.'

EXPERIMENTAL WORK.

The experimental work of the year began in the latter part of October, 1904, when the following work—preliminary to the birds going into winter quarters—was performed, viz.:—

The pullets were removed from the cockerels into their future winter quarters. This was done for the reason that the pullets at this season are apt to be annoyed with the attentions of the more precocious cockerels—particularly those of the Mediterranean breeds.

The pullets were placed by themselves so that they could be better cared for and more generously fed in order to induce early laying. This method of treatment will be found decidedly beneficial.

Care was taken by judicious feeding to prevent the older hens from going into winter quarters over-fat, which they are likely to become if heavily fed before beginning

to lay again. To still further prevent any risk of becoming over-fat the hens were not kept in the same pens with pullets. Experience has shown that pullets will lay well and keep in good condition on rations which are likely to make older hens too fat.

COMMENCEMENT OF WINTER LAYING.

The fowls were well over their moult and in good condition when they went into winter quarters, towards the end of November. Winter laying commenced at the beginning of December. The first hens to lay were Barred Plymouth Rocks, Buff Orpingtons, Silver Grey Dorkings, Buff Leghorns and Silver Laced Wyandottes. Egg laying was fairly general by the third week of the month. As at a similar period during the previous year the weather was extremely cold, and new laid eggs were in limited supply and high in price, especially during the Christmas season.

BUILDING UP PROLIFIC EGG LAYING STRAINS OF FOWLS BY MEANS OF TRAP NESTS. DETAILS OF FIRST YEAR'S RESULTS.

In January, 1904, the work of building up prolific egg laying strains of fowls was commenced. There are two methods by which this purpose may be accomplished. One is by 'observation' of the birds, and the other by 'trap nests.' The latter method was adopted as likely to prove most correct. The manner of operating the trap nests, may be described as follows: Each fowl, in the different laying pens, bears a number affixed to one of its legs. On entering a nest to lay the hen involuntarily releases a hinged door which falls and closes the exit and also prevents another fowl from making her way into the nest. After the hen in the nest has laid she is released by the attendant, who notes her number and marks it on a card conveniently situated in each pen. A complete history of each individual hen is so secured. The following tables show the results from the use of the trap nests for the first year and their value in making plain the good and bad qualities of the individual members of the laying pens. Additional information shows the composition and cost of the rations used, the value of the eggs sold and the profits made by each group of fowls.

TABLE 1.—Individual hen records shown by trap nests. 12 Barred Plymouth Rock hens, 3 years old. Pen 1.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
1	1	0	0	17	24	10	4	14	5	0	....	9	80	Broody and broken up twice during season.
19	0	0	23	19	16	13	7	4	3	0	...	0	85	" "
36	16	20	16	10	0	10	0	0	0	0	....	0	72	Used for setting from April 19 to May 12.
37	0	0	12	20	11	18	12	0	0	0	....	0	73	Broody twice during season, but broken up.
*41	0	1	15	14	0	0	0	0	0	0	...	0	30	Used for setting from Apl. 29 to July 1.
49	5	16	19	2	0	0	10	3	8	0	....	0	63	Setting from Apl. 7 to June 1.
62	2	10	0	16	...	...	....	....	....	....	....	0	28	Died April 28, '05.
*71	1	1	4	12	9	18	0	0	0	0	....	0	45	Broody once, but broken up.
80	11	19	24	17	0	0	17	6	10	19	....	0	125	Setting from Apl. 20 to July 3.
*86	7	5	1	3	8	1	0	0	0	0	....	0	25	Broody 3 times, but broken up.
*96	0	6	19	13	0	...	...	....	....	....	...	0	38	Died June 5, 1905.
100	0	1	20	17	21	7	0	0	0	0	....	0	66	Showed no inclination to set.
						1							1	This egg was laid in the straw on the floor of the pen.
Total.	43	77	158	159	89	78	50	23	26	19	....	9	731	



Photo. by F. T. Shutt.

1.—Chickens from Fowls kept in Unheated Houses with Scratching Shed attachment.
2.—Chickens from hardy strains. Colony House on the left ; Brooder on the right.
3.—Pullets and Cockerels from good egg-laying fowls.

Hens marked * were the poorest layers, and were neither used for breeding stock in our department nor were they sold for a like purpose.

RATIONS.

The rations used in feeding the above fowls were of the following composition: Whole grain ½ wheat ½ oats mixed, 1½ lbs. to each pen per day. Mash (wet) 1 lb. per day, composed of 2 parts shorts, 1 part ground oats, 1 part ground barley. Grit and oyster shells in regular supply. No meat, bone or roots were given to the fowls in this pen.

EXPENDITURE AND RECEIPTS.

Value of grain consumed, 435 lbs. at 1¼c. lb	$5 44	
" mash consumed, 178 lbs. at 1c. per lb.	1 78	
" grit and shell consumed, 30 lbs.	0 25	
" 15 egg boxes for shipping at 8c. each.	1 20	
	———	$8 67

RECEIPTS.

Value of 506 eggs sold for eating	10 55	
" 15 settings of eggs of 15 each.	15 00	
	———	$25 55
		———
or, $1.40⅔ per hen. Gain by this pen of.		$16 88

Eggs for eating purposes were sold during the year at the following prices, viz.:—Dec., 1904 and Jan., 1905, at 40c. per doz.; Feb., 35c.; March, 22c; April, May, June and July, 18c.; Aug., 20c.; Sept., 25c.; Oct., 30c.; Nov., 30c. These prices apply to all following cases where eggs were sold for eating.

The above table also shows that the average time taken to 'break up' a hen when broody was 6 days and it was 6 days more before she began laying again.

In the cost of the rations is included the feeding of the male bird from January to July. It is the same in following tables.

TABLE 2.—Individual Hen Records shown by Trap Nests, Barred Plymouth Rock hens, 3 years of age. Pen No. 2.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
4	0	0	2	18	14	10	0	0	0	0	....	0	44	Showed no broodiness.
**5	0	0	0	3	1	0	0	0	0	0	....	0	4	"
*20	0	1	0	10	10	4	11	0	0	0	...	0	36	Broody once, and broken up.
25	2	14	18	18	10	8	3	0	0	0	....	3	76	" "
30	0	1	16	13	9	5	7	5	1	0	....	0	57	Broody 5 times, but broken up.
*35	0	0	5	15	13	8	1	0	0	0	....	0	42	Broody once "
37	0	0	0	19	10	9	13	6	5	0	...	0	62	" four times "
67	1	15	5	12	12	9	2	4	2	0	....	0	62	" six " "
77	9	19	8	9	11	12	12	4	5	8	...	11	108	Broody in Mch. Used as setter from Apl. 7 to May 7. Broody but broken up four times after this.
78	0	0	16	6	2	10	11	1	0	0	....	0	46	Broody but broken up 3 times.
91	17	17	20	25	24	7	19	10	3	14	....	16	172	" once but broken up.
*98	0	0	10	15	13	2	0	0	0	0	....	0	40	" " "
						1			1				2	These eggs were laid in the straw on the floor.
Totals	29	67	100	163	129	85	79	30	17	22	....	30	751	

* Hens marked with an asterisk were the poorest layers, and were neither used nor sold for breeding purposes.

RATIONS.

Rations and their composition used in feeding above pen of fowls were as follows:—

Whole grain ration, ½ wheat, ½ oats, fed in quantity of 1½ lb. per pen per day.

Mash—same as in Table I, but fed once every three days and in quantity of ¾ lb. instead of 1 lb. per pen.

Cut bone and roots three times per week.

Grit, oyster shells, drink water in regular supply.

EXPENDITURE AND RECEIPTS.

Cost of grain, 450 lb. at 1¼c. per lb.	$5 62	
" mash, 130½ lb. at 1c. per lb.	1 31	
" cut bone, 34 lb. at 2c. per lb.	0 68	
" roots (in winter), 52 lb. at ½c. per lb.	0 26	
" grit and shell, 29½ lb.	0 20	
" 18 egg boxes for shipping at 8c. each.	1 44	
		$9 51

RECEIPTS.

Value of 481 eggs sold for eating	$9 87	
" 270 eggs for breeding, 18 settings of 15 eggs each.	18 00	
		$27 87
Gain of.		$18 36

or $1.53 per hen.

TABLE No. 3.—Individual Hen Records shown by Trap Nests, White Plymouth Rocks, three years of age. Pen No. 3.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July,	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
*3	0	0	0	0	0	0	0	....	....	....	...	0	00	Died August 15, 1905.
*10	0	0	0	14	18	0	0	0	0	0	...	0	32	Did not become broody.
32	21	22	13	18	24	5	10	0	0	15	....	17	145	Broody 3 times but broken-up.
68	0	7	7	14	22	13	0	4	0	0	....	0	67	Did not become broody.
76	1	0	....	....	..	....	....	....	....	....	....	0	1	Died Feb. 16.
86	0	2	....	....	....	....	....	....	....	....	..	0	2	Died March 7.
93	0	5	13	10	16	11	8	0	0	0	....	0	63	Did not become broody.
*95	0	0	4	19	9	0	1	0	0	0	....	0	33	" "
30	0	3	6	25	22	22	11	5	0	0	....	0	94	Broody once; broken up.
46	0	....	....	....	....	....	....	....	....	....	....	0	00	Died Jan. 23.
55	0	0	10	23	23	20	11	0	9	0	....	0	96	Did not become broody.
100	2	13	7	24	24	21	10	0	10	17	....	0	128	" "
Totals..	24	52	60	147	158	92	51	9	19	32	....	17	661	

Hens marked thus * were poor layers, and were neither used nor sold as breeding stock.

RATIONS.

Rations fed to above pen of fowls were:—
Wheat 1½ lbs. per diem.
Cut bone, ¾ lb. to 1 lb. every second day.
Roots, ¾ lb. every second day.
Mash was given in summer time to replace the cut bone and in the same quantity, viz., 1 part shorts, 1 part meat meal.

EXPENDITURE AND RECEIPTS.

Value of grain, 398 lbs., at 1¼c. per lb.	$4 98	
" mash, 125 lbs. at 2c. per lb.	2 50	
" roots, 137 lbs. at ½c. per lb. (in winter) . . .	0 68	
" grit and shell, 24 lbs.	0 20	
" 11 egg boxes for shipping at 8c. each.	0 88	
		$9 24

RECEIPTS.

Value of 503 eggs sold for eating.	$10 08	
" 158 eggs sold for breeding, 10½ settings of 15 eggs each.	10 50	
		$20 58
Gain of.		$11 34

or $1.13 per hen (10 birds in pen).

Nos. 30, 55 and 100 which were pullets were selected with other good layers for breeders. It will be noticed that several hens in this group did not become broody. Their selection for breeding stock might be the first step in building up a non-setting strain of White Plymouth Rocks.

TABLE No. 4.—Individual Hen Records by Trap Nests, Buff Orpington Hens, two years of age. Pen No. 4.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905										1904			
*1	0	1	5	2	0	0	0	0	0	0	....	0	8	Showed no desire to sit.
7	7	20	12	12	10	6	4	6	0	0	...	0	77	Broody 3 times; broken up.
12	18	10	11	0	0	0	12	4	3	0	....	2	60	Broody 4 times and set from June 2 to 23.
17	9	1	25	0	18	4	12	0	5	0	....	12	86	Broody 3 times; broken up.
29	4	5	15	0	13	0	9	5	0	0	...	15	66	Broody 3 times; set May 23 to June 17.
47	18	13	9	2	0	0	5	2	0	0	...	0	49	Broody twice; set and raised chicks from April 17 to July 13.
53	14	15	16	5	13	6	5	6	1	8	...	13	102	Broody 6 times; broken up.
63	0	2	21	3	0	12	6	3	7	0	....	0	54	Set from April 7 to May 3; Broody twice afterwards.
66	7	8	19	6	15	12	8	1	9	0	....	6	91	Broody 4 times; broken up.
76	16	7	12	14	0	14	10	0	3	6	....	15	97	" 5 "
*86	0	1	5	5	10	9	3	5	1	0	....	0	39	" 1 "
*90	0	0	0	0	0	13	1	0	0	0	...	0	14	" 1 "
	....	....	....	....	1	1	....	....	....	....	....	....	2	These two eggs were laid in the straw on the floor.
Totals . .	93	83	150	49	80	76	75	32	29	14	...	63	745	

The three hens marked * were neither used nor sold for breeding stock.

RATIONS TO ABOVE GROUP.

Whole grain ration composed of ½ wheat and ½ oats, 1½ lbs. per day.
Mash, twice per week.
Cut bone and roots, twice per week.
Grit, oyster shells and drink water in abundant supply.

EXPENDITURE AND RECEIPTS.

Cost of grain, 456 lbs. at 1¼c. per lb.		$ 5 70	
" mash, 135 lbs. at 1c. per lb.		1 35	
" cut bone, 35 lbs. at 2c. per lb. (in winter)		0 70	
" roots, 50 lbs. at ½c. per lb. (in winter)		0 25	
" grit and oyster shell, 35 lbs.		0 25	
" six egg boxes for shipping at 8c. each		0 54	
			$ 8 79
RECEIPTS.			
Value of 655 eggs sold for eating	$14 63		
" 90 eggs sold for breeding, 6 settings of 15 eggs each	6 00		
			20 63
Gain of			$11 84

Or $0.99 per hen. It will be noticed from the table that hens Nos. 1, 86 and 90 laid very few eggs. They were not only non-profitable, but partly ate the profits made by others. This is a striking instance of the value of the trap nest in discovering non-layers.

TABLE No. 5.—Individual New Records by Trap Nests—White Leghorn Pullets.
Pen No. 5.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total No. of Eggs laid.	Remarks.
19	17	6	9	23	19	13	8	0	0	0	....	6	95	
11	17	16	15	22	21	14	4	5	0	0	....	0	115	
34	4	6	9	10	14	9	2	0	0	0	....	0	54	
50	5	1	4	8	10	13	6	0	0	0	....	5	52	
53	16	12	13	16	12	9	3	0	0	0	..	9	90	
58	0	1	11	15	17	13	1	0	0	0	....	0	58	
63	14	15	18	18	21	17	4	0	0	0	....	0	107	
65	1	0	2	14	20	12	4	0	0	0	....	0	53	
69	0	1	6	13	16	16	9	5	3	0	....	0	69	
77	3	6	6	17	19	20	2	0	0	0	....	3	76	
84	7	12	9	20	16	9	0	....	....	....	....	0	73	Dead, August 26.
90	16	19	16	16	21	14	0	4	1	0	....	4	111	
97	11	6	8	19	1	10	1	0	1	0	....	0	57	
99	18	8	15	19	23	15	0	4	7	2	....	8	119	
Totals..	129	109	142	230	230	184	44	18	12	2	....	29	1,129	

Two pens were selected from the above group of fowls, one composed of good and the other of bad layers. The good layers were selected from hens Nos. 11, 53, 63 and 90, which represented an average of 105 eggs per hen per year. The poor egg layers

chosen were 34, 50 and 65, representing the small average of 53 eggs each per year. Results from these two widely differing pens will be noted with interest after another season.

RATIONS FED TO ABOVE PULLETS.

Whole grain ration, one-half oats one-half wheat, twice per day.

Mash composed of two parts shorts, one part ground oats and one part ground barley, three times per week.

Cut bone three times per week.

Roots three times per week.

Grit and oyster shells in abundance.

EXPENDITURE AND RECEIPTS.

Cost of grain, 440 lbs. at 1¼c. per lb.	$ 5 50	
" mash, 143 lbs. at 1c. per lb.	1 43	
" cut bone, 38 lbs. at 2c. per lb.	0 76	
" roots, 50 lbs. at ½c. per lb.	0 25	
" grit and shell.	0 25	
" 30 egg boxes for shipping at 8c. each	2 40	
		$10 59

Receipts.

Value of 679 eggs sold for eating.	$15 21	
" 450 eggs sold for breeding, 30 settings of 15 eggs each	30 00	
		$45 21
Gain of.		$34 62

or $2.88 per hen. For price of eggs sold at different periods see Table I.

TABLE No. 6.—Individual Hen Records by Trap Nests.—Cross-bred Pullets. Pen 26.

FROM DECEMBER 1, 1904 TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total No. of Eggs laid.	Remarks.
8	11	9	0	0	0	3	....	....	....	....	....	0	23	Dead June 16.
30	21	20	8	22	18	6	3	0	0	0	. ..	8	106	Showed no inclination to sit.
38	7	6	1	17	21	1	0	4	1	0	....	0	58	" "
39	7	9	21	14	14	7	0	0	0	0	....	0	72	" "
48	13	8	5	14	18	3	0	0	0	0	....	0	61	" "
74	14	20	23	13	0	....	....	....	....	....	....	0	70	Dead May 3.
75	10	5	5	13	10	6	1	0	0	0	....	0	50	Dead October 3.
76	7	18	10	15	23	7	0	0	0	6	...	0	86	No inclination to sit.
87	11	9	8	15	16	2	0	0	0	0	....	1	62	Broody once; broken up.
94	0	1	6	6	9	13	0	9	0	0	...	0	44	" "
Totals..	101	105	87	129	129	48	4	13	1	6	....	9	632	

RATIONS FED TO ABOVE PEN 26.

Whole grain ration ½ wheat ½ buckwheat . . .	20	ozs. per day.
Mash—2 parts shorts, 1 part oats ground, 1 part ground barley.	10	" every 3 days.
Cut green bone.	10	" "
Roots.	10	" "

Grit and oyster shells in sufficient quantity.

COST OF RATIONS.

Grain, 370 lbs. at 1¼ cents per lb.	$4 63	
Mash, 122 lbs. at 1 cent per lb.	1 22	
Cut bone, 24 lbs. at 2 cents per lb.	0 48	
Roots, 35 lbs. at ½ cent per lb.	0 18	
Grit and shell, 30 lbs.	0 25	
		$ 6 76

RECEIPTS FROM SALE OF EGGS.

Value of eggs sold during the year.	13 37
Gain made.	$ 6 61

or 66 cents per hen.

TABLE No. 7.—Individual hen records by trap nests. Cross bred pullets. Pen No. 27.

FROM DECEMBER 1, 1904 TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
2	6	18	21	26	22	12	2	4	0	0	....	0	111	Showed no desire to sit.
35	3	10	3	10	2	14	4	5	0	11	...	0	62	Broody once ; but broken up Sat from April 19 to May 27.
36	0	1	1	1	17	11	3	0	0	0	....	0	34	Broody 3 times after this.
40	4	13	5	21	5	16	10	6	0	0	....	0	80	Broody 4 times : broken up.
46	0	7	12	15	16	14	7	6	4	0	...	0	81	Showed no broodiness.
51	3	5	8	15	19	10	7	3	6	0	....	0	76	Broody once ; broken up.
60	2	10	13	19	21	11	11	1	0	0	...	0	88	" "
62	8	6	8	9	12	3	0	0	0	0	....	0	46	Did not sit.
69	6	0	1	13	21	19	8	4	0	13	....	0	79	"
70	2	6	2	17	10	17	5	0	4	0	....	0	63	Broody once ; broken up.
Totals..	28	76	74	146	145	127	57	29	14	24	...	0	720	

RATIONS FED TO ABOVE PEN 27.

Whole grain—Oats only.	20	ozs. per day.
Mash.	8	" "
Roots.	1 lb.	"

Grit and oyster shells in regular supply.

COST OF RATIONS.

Oats, 408 lbs. at 1 cent per lb.	$ 4 08	
Mash, 178 lbs. at 1 cent per lb.	1 78	
Roots, 154 lbs. at ½ cent per lb.	0 77	
Grit and oyster shells, 30 lbs.	0 25	
		$ 6 88

RECEIPTS FROM SALE OF EGGS

Value of eggs sold during the year..	$11 59
Gain made by this pen..	$5 71

or 57 cents per hen. Average number of eggs laid per hen, 72.

ESTABLISHING STRAINS OF PROLIFIC WINTER LAYERS COMBINED WITH CORRECT MARKET TYPE.

SELECTION BY MEANS OF TRAP NESTS.

With the object of establishing strains of fowls which would make good winter layers in unheated quarters, combined with correct market types, 23 Barred Plymouth Rock and a similar number of White Wyandotte pullets were placed, during the fall of last year, in a new poultry house of most approved pattern, a full description and illustration of which appeared in report of 1904. Both varieties of the fowls named are well known as most acceptable market types and particularly suited to make excellent layers in cold quarters. Trap nests were used to distinguish between the good and the bad layers. The results of the first year's experience in the prosecution of this work is given in the following tables, which with calculations based thereon convey useful and instructive information.

TABLE 1.—Barred Plymouth Rock pullets. Individual records shown by trap nests. Pen 34.

FROM DECEMBER 1, 1904 TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
2	0	2	0	11	12	15	5	0	0	0	....	0	45	Showed no inclination to set.
3	0	0	18	25	17	15	8	0	0	0	....	0	83	Broody twice; broken up.
4	0	0	3	12	21	16	12	2	7	0	....	0	73	" once "
*9	0	0	2	0	0	0	0	1	0	0	....	0	3	" 3 times "
15	0	2	24	17	18	6	1	0	0	0	....	0	68	Dead, Aug. 17.
21	0	0	3	18	12	9	8	3	0	0	.	0	53	Broody twice; broken up.
*26	0	0	0	8	8	7	7	0	0	0	...	0	30	" 4 times "
33	0	12	19	15	0	7	4	0	0	0	....	0	57	" twice "
34	0	0	9	14	15	12	10	1	0	0	....	0	61	Showed no broodiness.
39	0	2	13	18	22	5	14	0	0	0	....	0	74	Broody twice; broken up.
46	0	0	9	16	20	6	6	0	0	0	. .	0	57	" once "
53	0	3	18	18	16	8	7	5	0	0	. .	0	75	" " "
56	0	0	9	14	17	9	6	6	2	0	....	0	63	" 4 times "
61	0	0	19	17	16	12	11	0	0	0	....	0	75	" 3 "
66	0	1	0	1	0	0	0	0	0	0	....	0	2	Dead, May 24.
72	0	0	14	18	19	12	8	0	0	0	....	0	71	Broody 3 times; broken up.
74	0	1	16	11	15	10	7	....	4	14	....	0	78	" 4 "
75	0	10	11	6	0	0	10	0	0	0	....	0	37	" 3 "
85	0	5	13	21	10	22	13	5	0	8	....	0	97	" 3 "
94	0	6	14	19	18	15	8	2	0	0	....	0	82	" 3 "
95	0	6	23	23	17	12	18	1	0	0	....	0	100	" once "
96	0	0	17	26	11	11	13	9	0	0	....	0	87	" " "
98	0	0	13	21	16	18	12	0	0	0	....	0	80	" 3 times "
	....	....	....	....	....	1	....	1	....	....	....	....	2	These eggs were found on floor
Totals..	0	50	267	349	300	228	188	36	13	22	....	0	1,455	in straw.

None of the pullets in this or the following pen were used for sitters.
The cock bird died during first week in May, but was replaced.
The average egg production of the birds in this pen was 63¼ eggs per hen per year.

TABLE 2.—White Wyandotte Pullets. Pen 35.

FROM DECEMBER 1, 1904, TO NOVEMBER 1, 1905.

Hen No.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total of Eggs laid.	Remarks.
	1905											1904		
1	0	6	22	20	18	15	13	0	0	0	...	0	94	No inclination to set.
3	1	18	20	20	19	19	13	4	0	0	....	0	114	"
5	0	0	12	10	12	15	9	0	0	0	....	0	58	"
15	0	0	18	23	12	20	12	0	0	0	....	0	85	Broody once. Broken up.
* 16	0	0	0	0	2	22	14	0	0	0	...	0	38	No inclination to set.
19	0	7	11	9	14	12	12	2	0	0	....	0	67	Broody 4 times. Broken up.
24	6	18	16	18	13	16	10	1	0	0	....	0	98	" 3 " "
* 32	0	0	0	8	15	14	12	1	0	0	. .	0	50	No inclination to set.
41	0	7	14	18	13	10	14	0	0	0	..	0	76	"
* 43	0	0	2	6	5	17	7	0	0	0	...	0	37	Broody once. Broken up.
* 48	0	0	1	4	13	8	7	0	0	0	.	0	33	" "
* 49	0	0	1	17	18	16	3	0	0	0	...	0	55	" "
67	0	2	14	13	9	7	8	4	0	0	...	0	57	Broody 4 times. "
68	0	0	13	15	9	8	4	1	0	0	..	0	60	" 3 " "
* 69	0	3	0	13	14	7	8	0	0	0	....	0	45	No inclination to set.
73	0	0	13	20	12	7	11	0	0	0	...	0	63	"
* 77	0	0	7	9	13	12	7	1	0	0	....	0	49	Broody twice. Broken up.
* 79	0	0	9	6	11	13	5	0	0	0	....	0	44	" 3 times. "
83	4	4	21	19	16	11	11	0	0	0	....	0	86	No inclination to set.
* 84	0	0	0	15	18	10	4	0	0	0	....	0	47	"
85	0	4	10	6	12	10	8	0	0	0	....	0	50	Broody 3 times. Broken up.
88	3	4	11	18	13	7	4	0	0	0	....	0	60	" once. "
92	0	0	9	14	10	13	5	0	0	0	....	0	51	" " "
	0	0	10	5	3	3	1	3	0	0	....	0	25	These eggs were laid in the straw on the floor.
Totals..	14	73	234	306	304	292	202	17	0	0	....	0	1,442	

The egg production per hen per year of the above pen was $62\frac{3}{4}$.

The fowls of both pens had opportunity to run outside on a manure heap on and after February 26. The pullets in neither pen laid early for the reason that they were hatched late.

RATIONS AND HOW FED TO ABOVE PULLETS.

The rations fed to the fowls in the foregoing pens 34 and 35, and manner of feeding them was as follows:—

Whole grain—$\frac{1}{3}$ wheat, $\frac{1}{3}$ buckwheat, and $\frac{1}{3}$ oats. This was thrown in the straw on the floor of the scratching sheds, morning and evening, in quantities of 6 to 10 lbs., according to the weather. It was found that the most grain was consumed during the colder weather.

Mash.—Was composed of two parts shorts, one part ground oats, one part ground barley. This was fed at noon in quantity of 3 lbs. per day in a trough in the roosting room.

Cut bone.—Fed in quantity of $2\frac{1}{2}$ lbs. every 3 days.

Roots.—About 3 lbs. every 3 days.

Grit, ground oyster shells and drink water were in regular supply.

REVENUE AND EXPENDITURE IN CONNECTION WITH FOREGOING PENS 34 AND 35.

It will be noticed that the receipts in the following calculations are arranged to show in:—

No. 1 Table.---Revenue from sale of eggs only.

No. 2 Table.—Cost of rearing 100 chickens from May 1 to July 21, 1905, and then the cost of feeding the same chickens from July 21 to September 1 (4 months in all). These details show that if sold at end of July the chickens would have been worth more than at the later period.

No. 3 Table.—Value of the combination of egg layers and market types.

No. 4 Table.—Revenue made by C. E. F. Poultry Department by sale of eggs and stock for breeding pruposes.

TABLE 1.

Revenue from sale of Eggs for eating and hatching purposes with value of Birds and cost of feeding.

Value of 46 pullets at $1 each		$46 00
" 2 cockerels at $1 each		2 00
" grain, 272 lbs. at 1¼ cents per lb		34 05
" mash, 680 lbs. at 1 cent per lb		6 80
" cut bone, 178 lbs. at 2 cents per lb		3 56
" beets, 174 lbs. at ½ cent per lb		0 87
" grit and oyster shell		1 00
" 66 egg boxes for shipping at 8 cents each		5 28
		$99 56

Receipts from sale of Eggs.

Value of eggs sold during the year		$33 00
" " for breeding purposes, 66 settings, 15 eggs each		66 00
" 44 hens on hand, at $1		44 00
" 1 cock on hand, at $1		1 00
		$144 00

Lost during the year, 3 birds; gain, $44.44, or 96 cents per hen.

TABLE 2.

Showing cost of rearing 100 chickens from birth to the age of 2 months and 21 days (May 1 to July 21).

Chickens in lot: Barred Plymouth Rocks and White Wyandottes (45 cockerels and 55 pullets).

Cost of production—		
250 eggs for incubation, at 2 cents each		$5 00
Coal oil, 4 galls., at 25 cents, $1; interest on machine, $1.25		2 25
Food consumed—		
38 eggs, at 2 cents, cut up for mash		0 76
13 lbs. bread, at 3 cents		0 36
5½ lbs. rice, at 5 cents		0 27
5 lbs. oatmeal, 2½ cents		0 13
118 lbs. wheat, at 1¼ cents		1 48
17 lbs. ground barley, at 1 cent		0 17
10½ lbs. meat meal, at 2½ cents		0 26
12 lbs. ground oats, at 1 cent		0 12
Total cost of production		$11 80
Total weight of lot at age of 2 months and 21 days, 148½ lbs.		
Value of lot, 148½ lbs., at 25 cents per lb	$37 12	
Net profit		$25 32

Cost of feeding 100 chickens during 1 month and 10 days (July 21 to September 1).

Food consumed—	
12 lbs. meat meal at 2½ cents	0 30
5 lbs. barley, at 1 cent	0 05
30 lbs. shorts, at 1 cent	0 30
34 lbs. ground oats, at 1 cent	0 34
128 lbs. wheat, at 1¼ cents	1 60
25 lbs. oats, at 1 cent	0 25
Total cost of feeding	$2 84

Total weight of lot at age of 4 months, 272 lbs.
Total gain in live weight during feeding period, 123½ lbs.
Value of increased weight, 123½ lbs., at 13 cents .. $16 06

Net profit	$13 22

Total weight of chickens at age of 4 months, 272 lbs. at 13 cents		$34 66
Total cost of production, $11.80 and $2.84		14 64
Total net profit		20 02

TABLE 3.—Showing value of eggs sold from pens 34 and 35 for hatching, and value of chickens at 4 months from eggs from these pens.

COST OF PRODUCTION.

Value of breeding stock, 46 pullets at $1	$46 00	
Value of breeding stock, 2 cockerels at $1	2 00	
Value of food consumed by old birds	46 28	
Cost of rearing 100 chickens, at 4 months of age (Sept. 1)	14 64	
		$108 92

RECEIPTS FROM EGGS AND FLESH.

Value of eggs sold during the year	$33 00	
Value of eggs sold for breeding, 49 settings at $1.	49 00	
Value of 100 chickens at age of 4 months (Sept. 1), weight 272 lbs., at 13 cents	34 66	
Value of 44 yearling hens, at $1	44 00	
Value of 1 yearling cock, at $1	1 00	
Lost during the year, 3 birds.		
		161 66
Net profit		$52 74

or $1.15 by each hen.

TABLE 4.—Revenue made from sale of eggs for hatching and stock for breeding purposes. Pens 34 and 35.

Value of breeding stock, 2 cockerels, 46 pullets..	$48 00	
Value of food consumed..	46 28	
Cost of rearing 100 chickens at age of 4 months (Sept. 1)..	14 64	
Cost of 50 shipping egg boxes, at 8 cents each..	4 00	
Cost of 35 coops (shipping birds), at 25 cents each	8 75	
		$121 67
Value of eggs sold during the year..	$33 00	
Value of eggs sold for breeding..	49 00	
Value of 35 cockerels sold for breeding, at $1..	35 00	
Value of 10 pullets sold for breeding, at $1.. ..	10 00	
Value of 18 chickens sold for eating, 45 lbs., at 13 cents..	5 85	
Value of cockerel on hand, at $1..	1 00	
Value of 30 pullets on hand, at $1..	30 00	
Value of breeding stock..	48 00	
		211 85
Lost during the year, 3 birds..	$3 00	
Net profit..		$87 18

or $1.89½ by each hen.

INCUBATION.

HATCHING RESULTS FROM INCUBATORS AND HENS. CHICKENS HATCHED FROM HENS KEPT IN WARMED AND COLD HOUSES.

On the dates named in the following tables, two incubators—as described—were set in operation in the same building. Some interesting results are shown, among which will be noted the difference in the germ strength of eggs laid by fowls which were kept in houses without any artificial heat, but with scratching shed attachment, and those from hens in partially warmed compartments, but with no such opportunity for exercise or such abundance of fresh air.

Description of Eggs.	Pen No.	No. of Eggs.	Clear.	Dead Germs.	Dead in Shell.	Chickens hatched.	Percentage.	No. of Days.	Time of Cooling.	Temp. of Incubators. Hot Water.		Hot Air.		Temp. of Room. F.		Remarks.
									Minutes	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
Test No 1.—Hot Water Incubator.								1	0	100	100	100	101	68	76	
Barred Plymouth Rock	2	81	17	29	1	34	42	2	0	103	103½	102	103	54	78	
White Plymouth Rock	3	28	11	6	0	11	39¼	3	10	103	103	103	102½	62	86	3rd day, 1st cooling and turning, a.m.
White Leghorn	5	62	14	11	2	35	56¾	4	12	103	103	103	103	70	90	
Barred Plymouth Rock	34	38	8	4	3	23	60	5	15	103	103	103	102½	62	84	
White Wyandotte	35	61	15	6	2	38	62	6	15	102	103½	103	103	72	90	First test.
Totals	....	270	65	56	8	141	52¼	7	20	103	103	103	102½	72	88	
								8	20	103	104	103	103	70	80	
								9	25	103	102	103	103	74	90	
Test No. 2.—Hot Air Incubator.								10	30	103	103	103	103	64	86	
								11	30	102	103	103	103	68	82	
White Plymouth Rock	3	35	6	6	8	15	43	12	35	103	103	103	103	64	72	
White Leghorn	5	57	9	15	12	21	37	13	35	104	103	103	103	60	74	
Silver Laced Wyandotte	20	14	3	3	0	8	57	14	35	103	103	103	103	58	80	
Barred Plymouth Rock	34	51	16	6	4	25	49	15	35	102	103½	104	104	54	78	
White Wyandotte	35	65	19	10	8	28	43	16	40	104	102	102½	103	52	80	
Totals	.....	222	53	40	32	97	43½	17	40	103	103	103	103	68	86	Last test.
								18	45	103	104	103	103½	60	86	
								19	45	104	103	103	102½	62	82	Last cooling, p.m.
								20	0	104	103	104	104	64	87	
								21	0	103	103	102½	102	61	88	

Some results made evident from the above figures are:—

Eggs from hens in Nos. 34 and 35 pens (cold houses) showed greatest percentage of fertility and hatched the most chickens. This corroborates the experiences of previous years, as shown in reports of 1903 and 1904.

The eggs with the weaker germs were laid by hens in pens Nos. 2, 35 and 20, which were in partially warmed houses.

The birds which laid the eggs were given the same rations in both cases.

Eggs were turned once per day after cooling. During the cooling of the eggs the doors of the incubators were left open.

Neither incubator required any moisture.

Test No. 3.—Results from Eggs obtained from Farmers at end of August.

For the purpose of showing the hatching of chickens by incubator during the fair of the Canada Central Exhibition held in this city from September 8 to 16 last, the following number of eggs were purchased from neighbouring farmers and placed in two incubators. The eggs which were from hens that had laid well during the season, but had free run, showed remarkable fertility and strength of germ. The incubators were placed on an inclosed platform around which a constant stream of people passed. There was much vibration, but this did not seriously interfere with results.

Eggs from Farmers' Fowls. Hatched in Incubators.

Description of Eggs.	Kind of Incubator.	No. of Eggs.	Clear.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Percentage.	Remarks.
Barred P. Rock, farmers stock...	Hot water..	220	25	25	10	160	72⅔	
" "	Hot air.....	229	20	42	15	152	66¼	

After the usual stay of 24 hours in the nurseries of the incubators, the chickens were removed to brooders close at hand where they made good growth.

Test No. 4.—Hatching Eggs by Hens.

The following eggs, which were imported from England, were given to four hens on April 28 last. Results obtained were:—

Description of Eggs.	No. of Eggs.	Broken by Hens.	Clear.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Percentage.	Remarks.
Faverolle	14	2	3	2	1	6	43	Strong chickens.
Buff Orpington	24	6	5	1	3	9	37½	"
White "	24	8	4	3	3	6	29	"
S. G. Dorkings	24	.....	18	2	2	2	8⅓	Weak chickens.
Total	86	16	30	8	9	23	26½	

TEST No. 5.—The eggs as described in following table were from Experimental Farm stock. They were set under hens on April 28 last. Particulars are:—

Description of Eggs.	Pen No.	No. of Eggs.	Clear.	Dead Germs.	Dead in Shell.	Chickens Hatched.	Percentage.	Remarks.
Barred P. Rock	2	12	1	3	2	6	50	
White "	3	12	1	1	2	8	$66\frac{2}{3}$	
" Leghorn	5	13	2	1	2	8	$61\frac{5}{13}$	$53\frac{3}{4}$ per cent.
" "	5	13	3	2	2	6	46	
S. L. Wyandotte	20	12	0	1	1	10	$83\frac{1}{3}$	
Barred P. Rock	34	13	4	2	0	7	54	
Total		75	11	10	9	45	60	

FLESHING CHICKENS IN PENS AND CRATES.

The following tables show details in connection with the fattening of chickens conducted during the months of August and September last.

TABLE No. 1.—DETAILS OF EXPERIMENT IN FLESHING CHICKENS IN PENS, AUGUST 3, 1905.

Pen or Crate.	No. of leg band on Chicken.	Breed.	Cockerel or Pullet.	Age.		Weight.																		Remarks.
				Months.	Days.	Beginning of Experiment.		1st Week.		2nd Week.		3rd Week.		4th Week.		5th Week.		Average at beginning of experiment.		Average at close of experiment.		Average total gain by chickens in 5 weeks.		Average gain by chickens in 1 week.		
						Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Group No. 1—																									
Pen	11	B. Ply. R.	C	2	20	2	10	3	2	3	10	4	2	4	10	5	4								
"	15	S. L. Wy.	C	2	12	1	9	1	10	2	0	2	6	2	13	3	4								
"	23	"	C	2	12	1	1	2	0	2	5	2	12	3	5	3	12								
"	25	B. Ply. R.	C	2	20	2	5	2	11	3	0	3	8	4	0	4	9								
"	29	S. L. Wy.	C	2	12	1	7	1	10	2	2	2	10	3	1	3	8								
"	41	B. Ply. R.	C	2	20	2	5	2	10	3	0	3	6	3	14	4	6	2	3	4	5	2	2	0	6⅘	Capons.
"	44	"	C	2	20	2	10	2	12	3	4	3	12	4	6	5	0									
"	55	Crosses.	C	2	8	1	14	2	0	2	6	2	9	3	0	3	6								
"	71	B. Ply. R.	C	2	20	2	6	2	9	2	11	3	13	4	8	5	4								
"	88	Crosses.	C	2	8	2	2	2	5	2	14	3	3	3	10	4	1								
"	99	B. Ply. R.	C	2	20	2	13	3	2	3	8	4	0	4	8	4	14								
Group No. 2—																									
Pen	21	B. Ply. R.	C	2	20	2	7	2	12	3	1	3	7	3	14	4	2								
"	35	"	C	2	20	2	8	2	13	3	1	3	8	3	14	4	7								
"	50	"	C	2	20	2	10	3	1	3	4	3	10	4	2	4	8								
"	58	Crosses.	C	2	8	1	8	1	5	1	10	2	0	2	4	2	8								
"	59	S. L. Wy.	C	2	12	2	0	2	7	2	11	3	1	3	8	3	12								
"	70	B. Ply. R.	C	2	20	2	7	2	14	3	2	3	8	3	12	4	6	2	6	4	4	1	14	0	6	
"	72	"	C	2	20	2	8	2	11	3	1	3	7	3	15	4	5									
"	75	"	C	2	20	2	8	2	13	3	1	3	8	3	14	4	7									
"	83	S. L. Wy.	C	2	12	1	13	2	13	3	2	3	14	3	6	3	14									
"	88	B. Ply. R.	C	2	20	2	8	3	2	4	1	4	8	5	7	5	15	6	8							
"	90	"	C	2	20	2	12	3	3	4	4	4	15	5	6	6	10	7	2							

TABLE No. 2.—DETAILS OF EXPERIMENT FLESHING CHICKENS IN PENS AND CRATES, AUGUST 3, 1905.

Pen or Crate.	No. of leg band on Chicken.	Breed.	Cockerel or Pullet.	Age.		Weight.												Remarks.
				Months.	Days.	Beginning of Experiment.		1st Week.		2nd Week.		3rd Week.		4th Week.		5th Week.		Average at beginning of experiment.		Average at close of experiment.		Average total gain by chickens in 5 weeks.		Average gain by chickens in 1 week.		
						Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	
Group No. 3—																										
Crate	8	B. Ply. R.	C	2	20	2	12	3	13	3	3	3	11	4	6	4	12	2	12	4	15	2	3	0	7	
"	18	"	C	3	8	3	2	3	4	3	12	4	7	5	0	5	7									
"	33	"	C	3	4	3	1	3	6	3	12	4	0	4	5	4	12									
"	84	"	C	2	20	2	12	2	15	3	0	3	5	3	12	4	2									
"	92	"	C	2	20	2	8	3	0	3	6	3	14	4	4	4	10									
"	99	"	C	3	10	3	7	3	11	4	2	4	14	5	7	5	14									
Group No. 4—																										
Pen	26	B. Ply. R.	C	2	20	2	14	3	4	3	11	4	4	4	12	5	0	2	14	5	2	2	4	0	7½	
"	27	"	C	3	4	3	0	3	2	3	9	4	2	4	10	5	2									
"	36	"	C	2	20	2	15	3	10	4	1	4	8	5	2	5	2									
"	49	"	C	3	4	3	6	3	14	4	4	4	11	5	1	5	8									
"	68	"	C	2	20	2	9	3	1	3	8	4	1	4	10	5	0									
"	80	"	C	2	20	2	11	2	14	3	5	3	12	4	6	4	12									
"	81	"	C	3	4	3	4	3	11	3	14	4	8	5	3	5	11									
"	96	"	C	2	20	2	8	2	14	3	6	3	14	4	10	5	0									

SUMMARY OF RESULTS.

TABLE No. 3—WEIGHT, Development, Cost of Production, Profit from sale of Fowls.

Group No.	Pen or Crate.	Number of Chickens.	Weight. At beginning of experiment. Lbs.	Weight. At beginning of experiment. Oz.	Weight. At close of experiment. Lbs.	Weight. At close of experiment. Oz.	Total increase in 5 weeks. Lbs.	Total increase in 5 weeks. Oz.	Cost of Production. Chickens. Initial weight. Lbs.	Cost of Production. Chickens. Initial weight. Oz.	Cost of Production. Chickens. Value at 13c. per lb. $ cts.	Cost of Production. Food. Amount consumed in 5 weeks. Lbs.	Cost of Production. Food. Value at 1c. per lb. Cts.	Cost of production, one pound of increase. Cts.	Total cost of production. $ cts.	Return from sale at 14c. per lb. $ cts.	Profit. Labour not counted. $ cts.	Remarks.
																		Rations for each Group.
1	Pen....	11	24	2	47	4	23	2	24	2	3 13	56½	57	$2\frac{3}{10}$	3 80	6 61	2 81	Ground oats, 3 parts; ground barley, 2 parts; mixed with skimmed milk.
2	Pen....	11	25	15	46	15	21	0	25	15	3 37	57½	58	$3\frac{1}{4}$	4 05	6 57	2 51	
3	Crate...	8	22	4	39	5	17	1	22	4	2 89	51½	52	$3\frac{6}{10}$	3 51	5 50	1 99	10c. allowed for skimmed milk, in cost of production, for each group.
4	Pen....	8	23	3	41	3	18	0	23	3	3 01	51½	52	$3\frac{4}{10}$	3 63	5 76	2 13	

FERTILIZATION AFTER MATING.

In report of last year several instances are given with the object of showing how long after the removal of the male bird from the breeding pen, the effect of fertilization was strong enough to hatch strong chickens. The limit was found to be the eighth day. In the following table results are given to show how soon after mating the cock bird with the hens fertilization was sufficiently strong to hatch out vigorous chickens.

Hen No.	Date and Hour of First Mating.		Number of Hours between First Mating and laying of First Egg.	Number of Hours between First Mating and laying of First Fertile Egg.	Remarks.
	Date.	Hour.			
8	May 29..	3.16 p.m..	....	54.10 M.	A strong, healthy chicken hatched.
30	" 29..	0.00 " ..	....	.....	The first fertile egg was laid on fifth day after
38	" 29..	3.00 " ..	18.15 M.	65.40 M.	This egg was broken in turning. [mating.
39	" 29..	3.45 " ..	....	.....	Egg fertile ninth day after mating.
48	" 29..	4.05 " ..	20.35 M.	.....	" fourth "
75	" 29..	3.18 " ..	.....	42.18 M.	Strong chickens hatched.
76	" 29..	3.53 " ..	17.05 M.	41.08 M.	" "
87	" 29..	4.45 " ..	.....	39.15 M.	" "
94	" 29..	3.02 " ..	17.20 M.	41.50 M.	" "

In the above experiment pullets only were put into the breeding pen.

NUMBER OF EGGS LAID DURING THE YEAR.

The following number of eggs were laid during the different months of the past year:—

December, 1904	391
January, 1905	986
February	1,386
March	2,162
April	3,001
May	2,912
June	2,204
July	1,116
August	310
September	218
October	182
November	355
	15,223

EGGS LAID IN SIX MONTHS. OLD HENS VS. PULLETS.

The following table shows the number of eggs laid by old hens and pullets of different breeds during the first six months of the year. Results convey some useful and interesting lessons which are noted in a later page. The rations used and method of feeding them will be found effective in the winter production of eggs.

Results of Six Months Egg-laying by Pullets and Old Hens.

No.	Variety.	Age.	January.	February.	March.	April.	May.	June.	Totals for 6 months.
12	Buff Orpington	3 years old	90	80	150	49	70	71	511
11	White Leghorn	Pullets	142	116	122	185	178	135	878
12	S. G. Dorkings	2 and 3 years old	69	91	94	95	73	52	474
11	Black Minorcas	Pullets	54	53	76	136	180	119	618
11	White Leghorns	2 and 3 years old	25	16	75	129	143	111	499
11	Buff Leghorns	Pullets	62	52	58	112	112	85	481
11	Black Hamburgs	1, 3 and 4 years old	25	63	84	122	173	120	587
6	S. S. Hamburgs	1 and 2 years old	39	43	49	95	108	87	421
6	S. L. Wyandottes	2 years old	28	54	54	72	60	28	296
10	Buff Orpingtons	Pullets	86	103	85	103	38	67	482
10	White Wyandottes	3 years old	58	51	101	102	117	84	513
*23	B. P. Rocks	Pullets, late	6	50	268	349	300	228	1,201
*23	White Wyandottes	"	8	75	237	304	304	292	1,220
		Totals	692	848	1,453	1,859	1,856	1,479	8,181

*These pullets were in a poultry house with scratching shed attachment. No artificial heat. The windows of the scratching shed were open on fine days during winter.

Some deductions from the above record are noted as follows:—

Ten White Wyandotte hens, 3 years of age, laid more eggs than the same number of Buff Orpington pullets.

Eleven White Leghorn hens, two and three years of age, laid more eggs than the same number of Buff Leghorn pullets.

In both the foregoing cases it is likely that the older hens were of a better egg laying strain than the pullets. But experience has shown that it is advisable not to arrive at a hasty decision in this respect for in several instances it has been noticed that poor egg laying pullets made admirable layers the year after, when hens. In connection with this feature it is remarked on page 239 of 1904 report, under the caption, 'Are fowls as good layers one season as another?' as follows: 'Records of egg laying by pullets and hens in our department, extending over eight years, go to show that pullets which laid well during their first winter did not make as good layers the next, when hens.' It was also shown that poor egg laying pullets made admirable layers when hens the next year. It will be interesting to note if the selection by trap nests of the best layers from year to year will overcome this feature. As a further means of obtaining data on the subject two breeding pens each of 6 White Leghorn pullets and cock bird, have been placed side by side. The pullets and cock bird in one pen are from parent stock which the trap nests have shown to be poor layers, and the pullets and cock bird in the other by the same agency have been noted as excellent layers. Useful results are anticipated.

Another lesson pointed out is that the majority of 23 Barred Plymouth Rock, and same number of White Wyandotte pullets did not begin to lay until March. They were actually unproductive during the winter months of highest prices. The coldness of the house may be advanced as a reason for their non-laying, and to a certain extent it doubtless retarded their growth and rapid maturity. But these pullets should have been well developed and laying before going into winter quarters, and these results can only be attained by early hatching. Again, the pullets came from parent stock which had not been accustomed to cold quarters. This, in combination with late hatching, would certainly be deterrent to early winter laying.

Remedies for the latter and other undesirable features shown by the record are suggested as follows:—

To secure early winter layers in either cold or partly warmed houses the pullets should be hatched early and come from strong and vigorous parent stock.

To have prolific layers of large eggs in either unheated or partly warmed houses, the pullets should come from hens which have proved to be good layers of large eggs.

As a means to this end trap nests—the operations of which are described in preceding pages—are coming into more general use.

A WINTER EGG-PRODUCING RATION AND METHOD OF FEEDING IT.

The rations which were fed to the fowls enumerated in foregoing record, and manner of using them were as follows. Both will be found effective in the winter production of eggs, about which there are numerous and frequent inquiries:

A. M. Ration.—Wheat or buckwheat alone or mixed with oats. This should be scattered in the litter on the floor in order to incite the fowls to exercise in searching for it.

11 A.M.—Steamed lawn clippings, 3 times per week. Other days roots or vegetables.

Noon.—A few hands full of oats thrown into each pen, if necessary to keep the fowls in exercise. Three times per week cut green bones in the proportion of one pound to 15 hens, took the place of the oats.

P. M. Ration.—Mash three times per week in such quantity as would be eaten up clean. Observation has shown that when mash was fed at the morning ration there was a tendency on the part of the fowls to eat so much of it as to make them disinclined for exercise. On the other hand, where fowls are kept in unheated houses in parts of the country where the winters are cold a small quantity of mash in the morning would probably be warming, and an incentive to egg production. In our department it has been the practice to vary the composition of the rations occasionally as well as times of feeding them. As a result, it has been shown that where there is such variety there is little likelihood of egg eating or feather picking.

Fresh water, grit and broken oyster shells were before the fowls at all times, as they should always be. The mash was composed as follows:—

Shorts, two parts.
Ground oats, one part.
Gluten meal, one part.

Occasionally small potatoes were boiled and used as a part, with evident benefit.

Stock on Hand December 1, 1905.

Pen No.	Breed.	Cocks.	Hens.	Cockerels.	Pullets.	Remarks.
1	Barred Plymouth Rocks			1		
2	White Plymouth Rocks		3	1	11	
3	Buff Orpingtons	1	12			
4	"			1	11	
5	White Leghorns	1	13			
6	"			1	13	
7	Black Minorcas	1			12	
8	Silver Laced Wyandottes	1	4		9	
9	Buff Leghorns	1	7		2	
10	Mixed			4		2 Wh. Leghorns, 1 Bl. Minorca and 1 Bl. Hamburg.
11	Buff Orpingtons			4		
12	White Leghorns			5		
13	Black Minorcas			4		
14	Mixed			4		2 Wh. Leghorns, 2 Wh. Ply. Rocks.
15	"			5		1 S. L. Wy., 1 Wh. Ply. R., 1 Wy. 1 Bl. Min., 1 Buff Orp.
16	Black Hamburgs	1	6		4	
17						
18	White Leghorns			1	6	
19	"			1	6	
20	Barred Plymouth Rocks			1	4	
21	Light Brahmas		3	1	2	
22	Mixed			3		1 Bl. Minorcas, 2 Wh. Wyandottes.
23	Buff Orpingtons			1	5	
24	White Orpingtons			1	6	
25	Barred Plymouth Rocks	1	5			
26	Faverolles		2	1	4	
27	Silver Grey Dorkings	1	6			
28	Black Minorcas	1	5		3	
29	Crosses	1	7		2	
30	"		9		1	
31	Mixed			8		5 Capons, 2 S. L. Wy., 1 W. Leghorn.
32	"	1	3	1	13	
33	"			12		5 Wh. Wy., 6 Wh. Orp., 1 Wh. P. R.
34	Barred Plymouth Rocks			1	24	
35	White Wyandottes		6	1	18	
36	Barred Plymouth Rocks		16			
37	White Wyandottes	1	16			
	Total	12	123	63	156	

EXPERIMENTAL FARM FOR THE MARITIME PROVINCES.

NAPPAN, N.S., November 30, 1905.

To DR. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms.
Ottawa.

SIR,—I have the honour to submit herewith my annual report of operations on the experimental farm for the maritime provinces at Nappan, N.S.

The past season, although much more satisfactory than the season of 1904, has not been all that might be desired for crop growing. Spring came in rather late, with continued wet weather, although no great amount of rainfall, which, although retarding seeding operations, proved quite favourable to the growth of hay and grass. From June 20, to about the same date in July the weather was about all that could be desired, and all crops made great growth during this period. From this to the end of the growing season the drouth became more and more pronounced, reducing somewhat the apparently assured heavy grain crops, and even more so in the case of roots that usually make such a great proportion of their growth after September 15, they making practically none after this date, left only a fair crop. Aftermath and pasture was particularly poor, while the new take of clover and grass, that early in the season gave good promise, were in most places seriously damaged.

Following the custom of applying the tuberculin test to the herds from time to time at the experimental farms, it was decided to apply this test, although no symptoms had occurred to awaken suspicion that any of the animals might be affected. Accordingly tuberculin was applied for to the department, and arrangements made with Dr. F. G. Hall, V.S., Amherst, N.S., to test the herd, which was done on May 18 and 19, with the result that a very large proportion reacted or were suspicious.

This report being submitted to yourself, instructions were received to dispose of none of the products of those affected animals, to isolate those shown to be healthy, and that arrangements would be made by the department to have them tested again when a sufficient number of months had elapsed to insure reliability of second test.

Accordingly the second test was made by Dr. J. Frink, V.S., St. John, N.B., on October 11 and 12, which resulted in practically the same finding as the previous test.

As a result of both tests, out of a total of 71 head tested, only 14 were found that did not react either in one or other of the tests, 8 others reacted in the former and not the latter test, leaving 49 head reacting in both tests, May 18 and 19, and October 11 and 12.

I wish again to acknowledge my indebtedness for valuable assistance rendered by Mr. J. Thomas Coates, farm foreman, who has kept all records of crop experiments, and to Mr. R. Donaldson, herdsman, who has kept all records of live stock experiments, each doing so in a careful and painstaking manner.

WEATHER.

December commenced dull and open, followed by cool, bright weather to the middle of the month, except on the 6th and 8th, when there was a light fall of snow. The balance of the month was more or less broken with light snowstorms. A snowfall on the 18th made fairly good sleighing, and on the 26th improved the going in sleighs, which continued to the end of the month. The thermometer went to zero on the 16th, and registered below zero at night, from the 22nd to the 27th 14° below zero, the lowest for the month was on the 27th, and on the 31st the mercury fell to 8° below zero.

January commenced with sleighing, which continued until the first of April. The first part of the month was somewhat broken by light snow storms, the latter part of the month, however, was noted for many heavy storms, some of which blocked the roads

very badly. The thermometer registered below zero eleven times during the month, the lowest for some years being 31° below zero on the 15th.

The first week in February was fine, with the thermometer below zero much of the time. The remainder of February was also cold, but unusually stormy, with high winds. Roads were impassable much of the time, and railway traffic was suspended for several days. The mercury went below zero point at nine different dates during the month. Generally speaking, the month was the most stormy of any experienced here during the past 30 years.

The first of March opened mild, but was followed by cold, fine weather until the 8th. Snow then went rapidly for a few days, followed by exceptionally cold weather, the glass recording 14° and 15° below zero on the 14th and 15th respectively. The balance of March was fine, with some mild weather, and the large quantity of snow gradually went away without the usual freshets. Towards the last of the month the roads were bad and sleighing was about broken up.

The first of the month of April was fine and quite mild, with not nearly the usual amount of rain; this also assisted materially in preventing the usual spring freshets. The remainder of April was fine, with some light rains, but the sky was usually overcast, preventing many bright days. The total rainfall for the month was only 1·24 inches, of which 1·02 fell on the 21st and 22nd.

The rainfall during May was greater than usual, and was pretty well distributed over the whole month. Rain fell on eleven different dates during the month. The continued wet weather, together with a somewhat lower temperature than usual, prevented the usual amount of field work from being done, and made farm work and plant growth backward. The first seeding was done May 1. This, however, was followed by wet weather and the ground was not fit to work again until the 4th. Seeding was continued on the 5th and 6th, but on account of rain no seed was again sown until the 13th, when seeding continued uninterrupted to the 17th. The balance of May, after the 20th, was favourable for getting spring work done. Very high winds prevailed on the 25th and 26th. The thermometer registered frost on six different nights during the month.

On June 7, in the early morning, the thermometer registered 5° of frost. This frost did considerable damage to tender plants, also to fruits which were then in full bloom. The first part of June was more or less broken with showery weather. Rain is recorded on twelve different dates. Exceptionally fine weather prevailed from the 16th to 26th. The temperature was about the average during this month, and crops that had such a backward appearance early, forced rapidly ahead during the latter part of the month. Only once during the month did the temperature go above 78°, and that was on the 15th when 81° was registered.

The rainfall during July was light, and only on six dates did rain fall, which totalled only 1·56 inches. July was about as warm as usual, but was not so high in temperature as during the previous year. The crops made exceptionally good growth during the first part of the month, and the hay crop was above an average. The grain crops, however, suffered greatly for want of rain during the last of the month. The thermometer went to 80° or above on the 8th, 10th, 12th, 13th, 15th, 19th and 29th, when 81°, 82°, 82°, 80°, 80°, 83° and 81° was registered respectively.

August was unusually dry, the only rainfall during the month of any consequence, was on the 6th and 7th of ·62 inches, and on the 30th when ·59 inches fell. The total rainfall for the month was 1·53 inches. Grain crops were very materially reduced in yield, and root crops got a severe set back owing to the prolonged dry weather. The average temperature for the month was the same as the previous year. The thermometer registered 80° or above 80° on the 4th, 6th, 8th, 10th, 11th, 12th and 22nd, when 80°, 80°, 81°, 81°, 82° and 81° was registered respectively. On the early morning of the 15th the temperature fell to freezing point in some parts of the maritime provinces and did great damage to corn, potatoes, buckwheat and other tender plants. Our thermometer registered only 38°, six degrees from freezing.

The month of September was more or less broken with showery weather, the heaviest rainfalls, however, were registered on the 4th, 6th, 14th and 26th, when 1·33 inches of rain fell. The weather conditions outside of these days permitted of getting grain harvested in a satisfactory manner. No frosts were recorded here during September.

October was unusually dry and fine weather continued almost all of the month, the rainfall being only 1·29 inches in all. No frost was recorded up to the 11th and 12th, when 5° and 7° respectively were recorded. Frost was again recorded on the 23rd.

The month of November was also unusually fine most of the time, with frequent light rains up to the 15th, 16th and 17th, 2·10 inches falling on those dates. Dry weather then continued until the 29th, when 1·61 inches of rain fell. Very little frost was recorded in this month until the 15th, when the mercury fell to 5° below zero. From the 19th to 22nd slight frosts were recorded and from the 27th to the end of the month, frost was recorded each day, while on the 29th 54° was also recorded, being only one degree below the warmest record for the month.

Rainfall.

	1905.		1904.	
April	1·24	inches.	2·92	inches.
May	3·02	"	1·76	"
June	3·30	"	1·74	"
July	1·56	"	2·15	"
August	1·53	"	3·51	"
September	3·38	"	4·52	"
October	1·29	"	5·00	"
November	4·72	"	3·39	"
	20·04	"	24·99	"

METEOROLOGICAL RECORD.

The maximum and minimum thermometrical observations for the year beginning December 1, 1904, and ending November 30, 1905:—

Month.	Maximum.	Minimum.
1904.		
December	1st, 38° above zero	27th, 14° below zero.
1905.		
January	1st and 10th, 35° above zero	15th, 31° "
February	13th, 38° above zero.	6th, 18° "
March	30th, 50° "	15th, 15° "
April	29th, 66° "	3rd, 20° above zero.
May	29th, 73° "	13th, 22° "
June	15th, 81° "	7th, 27° "
July	19th, 83° "	3rd, 4[illegible]° "
August	12th, 82° "	16th, 38° "
September	11th, 74° "	[illegible]th, 33° "
October	5th, 68° "	27th, 17° "
November	25th, 55° "	15th, 5° below zero.

EXPERIMENTS WITH OATS.

Experiments were again continued this year with the leading sorts of oats which were grown in uniform test plots of one-fortieth acre each. Thirty-nine varieties were included in this test. The plots received the same treatment and were on soil practically uniform throughout.

The ground was a clay loam, on which clover hay was grown the previous year

(1904). Grain in 1903 and roots in 1902 for which crop 20 one-horse cart loads of barnyard manure per acre was used. The land was ploughed in the fall and a very light crop of aftermath turned under. This spring it was harrowed with spring tooth, disc and smoothing harrows until a fine tilth was made. The seed was sown on May 15 with the seed drill at the rate of 2½ bushels per acre. This ground was also seeded down to clover and timothy at the rate of 7 lbs. Mammoth Red clover, 3 lbs. alsike and 12 lbs. timothy seed per acre, by means of a grass seed attachment to the grain seeder. The grain was selected heads of the previous season's crop, being cut from the various plots at harvest time.

No fertilizer was used on these plots this season. The grain started rather slowly and in some places weeds got somewhat of a start, grass seed and clover also started fairly well; although not growing fast this grain always retained quite a deep, dark colour and from about the first of June to the middle of July made very good growth, from this time until ripe, the continued dry weather had the effect of reducing the prospects of a large crop. The straw was stiff and very clean, with no rust whatever, but quite a few heads of smut were noticed. The following yields were obtained from these plots:—

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including Head.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured Bushel after cleaning.	Smutted.
				Inches.	Inches.		Lbs.	Bush.	Lbs.	Lbs.	
1	Improved Ligowo	Aug.	22	99	40 to 45	5 to 8	Branching	5,600	92	32	35½	Slightly.
2	Mennonite	"	22	99	41 " 46	6 " 8	"	4,800	90	20	34	"
3	Twentieth Century	"	22	99	42 " 46	6 " 8	"	4,840	85	30	36¼	"
4	Joanette	"	22	99	40 " 44	6 " 9	"	5,400	83	18	34	"
5	Siberian	"	28	105	42 " 46	6 " 9	"	4,680	82	12	33½	"
6	Thousand Dollar	"	23	100	40 " 45	6 " 8	"	4,680	80	0	36⅗	"
7	Black Beauty	"	21	98	40 " 44	5 " 8	"	5,400	80	0	34½	"
8	Bavarian	"	23	100	40 " 46	5 " 8	"	4,520	78	28	34	"
9	Pioneer	"	21	98	40 " 44	6 " 9	"	5,040	77	22	35	"
10	Sensation	"	22	99	40 " 45	5 " 7	—	4,680	77	2	37	"
11	Waverley	"	22	99	42 " 46	6 " 9	"	4,720	76	16	36	"
12	Lincoln	"	23	100	42 " 46	6 " 8	"	4,600	75	30	35	"
13	Banner	"	22	99	42 " 46	6 " 9	"	4,800	75	10	34¼	"
14	Swedish Selected	"	22	99	40 " 46	6 " 8	"	4,600	74	4	37⅕	"
15	Improved American	"	24	101	42 " 46	7 " 9	"	4,600	72	32	33¾	Badly.
16	Golden Giant	"	26	103	40 " 46	8 " 11	Sided	3,320	72	32	30½	Slightly.
17	Buckbee's Illinois	"	26	103	42 " 46	6 " 8	Branching	3,640	70	20	36	"
18	Olive Black	"	28	105	40 " 45	6 " 9	Sided	3,480	70	0	36¼	"
19	Golden Beauty	"	23	100	40 " 45	5 " 7	Branching	4,280	69	14	34	"
20	Goldfinder	"	28	105	40 " 44	6 " 8	"	3,040	67	2	33	"
21	Danish Island	"	23	100	40 " 45	5 " 7	"	3,400	65	30	35	"
22	Golden Fleece	"	26	103	40 " 45	5 " 7	"	4,040	65	10	35	"
23	Holstein Prolific	"	23	100	40 " 44	6 " 8	"	3,800	65	10	34⅕	"
24	Kendal White	"	28	105	42 " 47	6 " 10	Sided	3,240	64	14	34¼	"
25	White Giant	"	23	100	40 " 43	5 " 7	Branching	3,320	62	32	33½	"
26	Columbus	"	24	101	40 " 45	5 " 7	"	2,520	62	32	34	"
27	Golden Tartarian	"	29	106	38 " 42	7 " 10	Sided	3,800	62	12	32	"
28	American Beauty	"	28	105	40 " 45	5 " 8	Branching	3,280	61	6	34½	"
29	Abundance	"	23	100	42 " 46	6 " 9	"	4,400	58	28	33	"
30	American Triumph	"	29	106	44 " 48	6 " 10	"	4,680	57	22	34¾	"
31	Storm King	"	23	100	42 " 47	6 " 9	Sided	3,600	57	22	36	"
32	Wide Awake	"	24	101	42 " 46	6 " 8	Branching	3,680	56	16	35	Badly.
33	Irish Victor	"	23	100	40 " 44	5 " 8	"	3,600	56	16	34	"
34	Kendal Black	"	28	105	42 " 46	7 " 10	Sided	3,880	55	10	37	Slightly.
35	Tartar King	"	23	100	41 " 45	6 " 8	"	3,000	50	20	37¼	Badly,
36	Milford Black	"	26	103	40 " 46	7 " 10	"	3,000	47	2	37½	"
37	Milford White	"	26	103	38 " 42	6 " 9	"	3,920	46	16	37½	"
38	Early Golden Prolific	"	26	103	42 " 46	5 " 8	Branching	3,040	45	30	34	Slightly.
39	Scotch Potato	"	23	100	40 " 44	5 " 8	"	3,080	45	30	33½	Badly.

EXPERIMENTS WITH BARLEY.

Eighteen varieties of six-rowed and fifteen varieties of two-rowed barley were sown in uniform plots on one-fortieth acre each, on May 16. The land was a clay loam that had been in clover hay the previous year (1904), in grain in 1903 and roots in 1902, for which crop barnyard manure at the rate of 20 one-horse cart loads per acre was used. No manure or fertilizer of any kind has been applied since. This land was ploughed in the autumn and a very light crop of aftermath turned under and was worked up in the spring with spring-tooth, disc and smoothing harrows, and sown with seed selected from the previous year's crop by cutting picked heads at harvest time.

The grain was sown with the seed drill at the rate of 2 bushels per acre, and at the same time there was also sown 7 lbs. Mammoth Red clover, 3 lbs. Alsike Clover and 12 lbs. Timothy seed per acre. The grain made rather slow growth for some time, but always retained a good healthy colour. Continued dry weather caused premature ripening. There was no rust, but some heads of smut. The following yields were obtained:—

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of ripening	No. of Days Maturing.	Length of Straw, including Head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush. lbs.	Lbs.
1	Albert	Aug. 18	94	38 to 42	Stiff	2½ to 3	4,000	49 8	52¾
2	Brome	" 21	97	37 " 42	"	2 " 2½	4,120	49 8	48
3	Mensury	" 19	95	38 " 42	Medium	2 " 3	4,040	48 16	48
4	Common	" 17	93	36 " 41	Stiff	2 " 2½	3,240	47 24	50½
5	Stella	" 19	95	36 " 40	"	1¾ " 2½	3,880	45 ..	51
6	Empire	" 18	94	36 " 40	"	2 " 3	3,480	41 32	50¾
7	Royal	" 17	93	35 " 38	"	1½ " 2½	4,000	39 8	51
8	Summit	" 19	95	36 " 40	"	1¾ " 2½	3,000	38 36	51¾
9	Champion	" 17	93	40 " 44	Medium	2 " 3	4,020	38 16	44
10	Argyle	" 18	94	37 " 42	Stiff	2½ " 3	2,920	37 24	49½
11	Trooper	" 17	93	35 " 38	"	1½ " 2½	3,200	34 28	51
12	Rennie's Improved	" 17	93	33 " 36	"	1½ " 2¼	3,640	34 28	50
13	Oderbruch	" 17	93	36 " 40	Medinm	2 " 3	3,620	34 8	50
14	Yale	" 17	93	35 " 38	Stiff	2 " 2½	3,080	33 16	50
15	Nugent	" 18	94	32 " 35	"	2 " 2½	2,520	31 32	49¾
16	Odessa	" 17	93	36 " 40	Medium	2 " 3	3,280	31 12	49
17	Claude	" 17	93	33 " 36	Stiff	1½ " 2	2,480	31 12	50
18	Mansfield	" 19	95	37 " 39	"	1½ " 2½	2,680	30 40	51½

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of ripening	No. of Days Maturing.	Length of Straw, including Head	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	Weight per measured bushel after cleaning.
				Inches.		Inches.	Lbs.	Bush. lbs.	Lbs.
1	French Chevalier.....	Aug. 19	95	32 to 37	Medium....	3 to 4	3,880	44 28	52½
2	Beaver.....	" 19	95	32 " 38	"	2 " 3¼	3,200	43 16	52½
3	Danish Chevalier.....	" 19	95	30 " 36	"	3 " 4	4,040	42 44	53
4	Harvey.....	" 19	95	40 " 43	Stiff.....	2 " 3½	4,080	39 8	51¼
5	Newton.....	" 19	95	38 " 42	"	2 " 3	3,600	38 36	51
6	Logan.....	" 19	95	40 " 44	"	2 " 3	3,880	38 16	50
7	Jarvis.....	" 19	95	40 " 44	"	2 " 3	3,720	36 32	50¾
8	Gordon.....	" 19	95	36 " 40	"	2 " 3	3,080	35 40	50½
9	Invincible.....	" 21	97	30 " 34	"	2 " 3	3,160	35 20	48
10	Sidney.....	" 18	94	36 " 41	"	2 " 3	4,000	35 ..	52½
11	Dunham.....	" 19	95	36 " 41	"	2 " 3	3,800	34 28	51½
12	Canadian Thorpe.....	" 21	97	40 " 45	"	2 " 3	3,680	34 8	51½
13	Clifford.....	" 19	95	35 " 40	"	2 " 3	2,600	33 16	50½
14	Swedish Chevalier.....	" 21	97	26 " 30	Medium ...	3 " 5	3,000	25 20	50½
15	Standwell.....	" 21	97	36 " 40	Stiff.....	2 " 3	2,440	25 ..	48½

EXPERIMENTS WITH SPRING WHEAT.

Twenty-eight varieties of spring wheat were sown in plots one-fortieth acre each, on land that was a light sandy loam, and had been in clover hay the previous season, grain in 1903 and roots in 1902, for which crop 20 one-horse cart loads of stable manure was used. The land was ploughed in the autumn and a light crop of second-growth clover turned under. This spring this was well worked up with spring tooth and smoothing harrows, and sown with the drill seeder May 13, at the rate of 1¾ bushels per acre, together with Mammoth Red Clover 7 lb., Alsike Clover 3 lb., and Timothy seed 12 lb.

Owing to the continued cold and wet weather this crop made rather a poor start and weeds made fairly good headway, which had a decided influence on the result. No rust was observed but some smut was noticed. The following yields were obtained:—

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.		Weight per measured bushel after cleaning.
		1905.		Inches.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
1	Pringle's Champlain..	Aug. 25	104	38–43	Stiff.....	2 –3½	Bearded..	4,120	35	..	63¼
2	Monarch.....	" 29	108	40–45	"	2½–3¾	Beardless.	3,480	34	40	61½
3	Preston.....	" 25	104	36–42	"	2½ 3¼	Bearded..	3,720	34	..	63
4	Bishop.....	" 25	104	36–40	"	2 –2½	Beardless.	3,560	32	..	62
5	Colorado.....	" 25	104	40–43	"	2 –3	Bearded..	3,880	31	20	63
6	Stanley.....	" 28	107	40–44	"	2½–3½	Beardless.	3,640	30	40	61½
7	McKendry's Fife.....	" 29	108	40–44	"	2½–3½	" ..	3,080	30	40	61
8	Laurel.....	" 29	108	40–44	"	2½–3½	" ..	3,600	30	..	60
9	Hungarian White....	" 25	104	36–40	"	2 –3	Bearded..	2,880	29	..	62
10	Hayne's Blue Stem...	" 30	109	36–40	"	2 –3	Beardless.	2,920	28	20	62
11	Advance.....	" 25	104	38–42	"	2 –3	Bearded..	3,400	28	..	62
12	White Fife.....	" 29	108	40–44	"	2 –3½	Beardless.	3,800	27	40	62
13	Clyde.....	" 29	108	40–45	"	2½–3½	" ..	3,200	27	20	61½
14	Power's Fife.....	" 30	109	38–42	"	2 –3	" ..	3,920	27	..	62
15	Wellman's Fife	" 29	108	40–45	"	2½–4	" ..	3,860	26	40	61
16	Australian No. 9....	" 31	110	36–40	"	2 –3	" ..	2,400	26	..	59½
17	Countess.....	" 29	108	36–42	"	2 –3	" ..	2,520	26	..	61
18	Dawn.....	" 26	105	38–42	"	2 –3	" ..	2,800	25	20	61¾
19	Weldon.....	" 30	109	39–42	" ...	2 –3	" ..	2,280	25	..	61
20	Red Fife.....	" 28	107	38–42	"	2 –3	" ..	2,560	24	40	60¼
21	White Russian	" 29	108	38–43	"	2 –3½	" ..	2,520	24	..	59½
22	Red Fern.....	" 26	105	34–38	"	2 –3	Bearded..	2,280	20	40	62½
23	Minnesota No. 163...	" 30	109	40–42	"	2 –3½	Beardless.	2,200	20	20	60
24	Percy.....	" 30	109	40–44	"	2 –3	" ..	3,080	20		60
25	Chester.....	" 31	110	36–40	"	2 –3	" ..	2,520	20	..	61½
26	Huron.....	" 25	104	36–40	Medium..	2 –3	Bearded..	2,280	18	..	61
27	Early Riga.....	" 22	101	30–35	" ..	2 –3	Beardless.	2,000	14	..	62
28	Herisson Bearded....	" 25	104	30–35	Weak...	1½–2	Bearded..	2,020	13	20	63

EXPERIMENTS WITH MACARONI WHEAT.

Four varieties of Macaroni wheat were grown in plots of one-fortieth acre each, alongside of the other wheat plots. The land was similar in character and received the same treatment as in the wheat plots and was sown at the same time (May 13). These varieties are separated from the other wheats on account of their inferior milling qualities. The following are the yields obtained:—

MACARONI WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.		Weight per measured bushel after cleaning.
		1905.		Inches.		Inches.		Lbs.	Bush.	Lbs.	Lbs.
1	Roumanian.....	Aug. 30	109	38–42	Medium..	2 –2½	Bearded..	2,280	22	..	62¾
2	Goose.....	" 29	108	34–40	" ..	1½–2	" .	1,720	17	20	63
3	Yellow Gharnovka...	" 29	108	35–41	" ..	1½–2	" ..	2,320	16	40	62½
4	Mahmoudi.....	" 29	108	35–38	" ..	2 –2½	" ..	1,800	14	..	62¾

EXPERIMENTS WITH EMMER AND SPELT.

Two varieties each of Emmer and Spelt were sown May 13 in plots of one-fortieth acre each. The land was similar to that on which the other wheats were sown and received the same treatment. The yield from these plots is given in pounds, as with the

ordinary threshing the chaff is not separated from the kernels as in other grain and cannot well be compared with the other sorts which are threshed clean.

EMMER AND SPELT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
		1905.		Inches.		Inches.		Lbs.	Lbs.
1	Red Spelt	Sept. 2	112	38–43	Stiff	2 –3	Beardless.	3,600	2,440
2	White Spelt	" 2	112	34–41	"	2 –4	"	3,000	2,360
3	Red Emmer	Aug. 31	110	35–40	"	2 –3	Bearded	2,200	1,120
4	Common Emmer	" 31	108	32–38	"	1½–2	"	2,400	2,400

EXPERIMENTS WITH FIELD PEASE.

Thirty varieties of pease were sown in uniform plots of one-fortieth acre each, on a clay loam. This was in a poor state of fertility, having been in pasture for many years and no fertilizer having been applied for at least ten years. The land was ploughed in the fall and worked up this spring with disc and spring-tooth harrows, and sown with the drill seeder at the rate of from 2 to 3 bushels per acre, Mammoth Red clover being sown at the same time at the rate of 10 lbs. per acre.

The following yields per acre was obtained:—

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
					Inches.	Inches.		Bush. Lbs.	Lbs.
1	Mummy	Sept. 9	109	Medium	36–40	1½–2	Medium	39 20	63⅕
2	Nelson	" 9	109	"	30–40	1½–2¼	"	38 ..	63⅕
3	English Gray	" 14	114	Good	37–42	2 –2½	"	37 20	60⅕
4	White Marrowfat	" 11	111	"	36-42	2 –3	Large	35 40	63¾
5	Paragon	" 2	102	Medium	30–35	1½–2	Medium	34 20	63
6	White Wonder	" 2	102	"	30–36	1½–2	"	34 ..	63½
7	Black Eye Marrowfat	" 11	111	Good	36–42	2 -3	Large	34 ..	62
8	Duke	" 13	113	Medium	34-38	2 –2½	"	32 ..	62
9	Chancellor	" 12	102	"	29-33	1 –2	Small	31 40	64
10	Picton	" 11	111	Good	34-38	2 –2½	Medium	31 20	63⅕
11	Prince Albert	" 12	112	Medium	35-40	1½–2	Small	31 ..	62⅕
12	Arthur	" 2	102	"	28–32	1½–3	Medium	30 40	62¼
13	Daniel O'Rourke	" 9	109	"	33–37	1½–2	Small	30 ..	64
14	Golden Vine	" 11	111	Good	33–37	1½–2	"	30 ..	63
15	Pride	" 11	111	Medium	34–35	1½–2	Medium	28 20	63
16	German White	" 6	106	Good	34–38	1½–2½	"	28 ..	63½
17	Carleton	" 11	111	"	34–40	2 –2½	"	26 40	63⅕
18	Gregory	" 11	111	"	35–49	1½ 2½	"	26 40	62½
19	Mackay	" 14	114	"	38–42	2 -3	Large	26 20	63
20	Crown	" 2	102	"	30–36	1½–2	Small	26 ..	64
21	Wisconsin Blue	" 11	111	"	34–38	1½–2½	Medium	26 ..	64½
22	Pearl	" 14	114	Medium	30–34	2 –2½	"	25 40	62
23	Kent	" 11	111	Good	36–41	2 –2½	Large	25 20	63
24	Prussian Blue	" 9	109	Medium	33–38	1½ -2	Small	24 40	63
25	Agnes	" 12	112	Good	38–44	2 –3	Large	24 40	62¼
26	Archer	" 13	113	"	34–38	2 –2½	Medium	24 20	63
27	Prince	" 11	111	"	36–40	2 –2½	"	24 ..	62
28	Early Britain	" 6	106	"	33–36	2 –3	Large	24 ..	62
29	Macoun	" 14	114	"	38–43	2 –2½	"	19 20	62¾
30	Victoria	" 12	112	"	36-40	2 –2½	"	15 20	62

EXPERIMENTS WITH BUCKWHEAT.

Five varieties of buckwheat were sown in uniform test plots of one-fortieth acre each. They were sown June 20, and cut September 1 and 2. The land was a clay loam that had been in clover and timothy the previous season. This land had received a dressing of barnyard manure in 1902, when a crop of roots was grown. No fertilizer of any kind was used since. The sod was ploughed in the fall of 1904 and worked up well this spring. The following yields were obtained:—

BUCKWHEAT.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Yield per Acre.		Weight per Bushel.
					Inches.		Bush.	Lbs.	Lbs.
1	Siberian or Tartarian	June 20	Sept. 1	73	28–32	Stiff	43	16	50
2	Rye Buckwheat	" 2	" 2	74	36–40	"	37	24	51
3	Gray Buckwheat	" 2	" 2	74	32–36	"	32	24	48
4	Japanese	" 2	" 1	73	36–42	"	25	40	43
5	Silverhull	" 2	" 2	74	32–36	"	24	28	50

FIELD CROPS OF GRAIN.

Seventeen acres of field grain was grown. Ten acres of which was in plots of two acres each, the remaining seven acres in one lot. The land was a clay loam, the previous crop having been roots and corn, for which crop barnyard manure at the rate of 20 tons per acre was used. The plots ran crosswise of the field, the roots and corn plots having been run lengthwise of the field the previous year, consequently each grain plot was on the like amount of root and corn land. The land was ploughed in the spring and well harrowed, after which the grain was sown with the seed drill and with 3 bushels in the case of oats, 2 bushels in the case of barley and 3 bushels in the case of mixed grain, Mammoth Red clover at the rate of 7 lbs.; Alsike clover, 3 lbs., and Timothy seed 12 lbs. per acre was sown with this crop. The following is the crop harvested:—

FIELD CROPS OF GRAIN.

Crops.	Yield per Acre.		Weight per Bushel.
	Bush.	Lbs.	Lbs.
2 Acres Odessa Barley sown May 29, cut Aug. 23	39	12	48
2 Acres Mixed Grain sown May 29, cut Aug. 24	53	20	40
2 Acres Sensation Oats sown May 29, cut Aug. 29	62	2	34
2 Acres Waverley Oats sown June 1, cut September 5	59	14	34
2 Blk. Tartarian Oats sown June 1, cut September 8	43	17	34
7 Acres Mixed Grain sown June 5, cut Sept. 5	42	0	40

FIELD CROPS OF MIXED GRAIN.

Eight acres was sown with mixed oats, barley and pease. The land was a clay loam in a very poor state of fertility, not having received manure or fertilizer of any kind for at least ten years. This crop was sown May 6 and cut August 23. The yield was 30 bushels, 15 lbs. per acre, weighing 40 lbs. per bushel.

Five acres mixed grain was grown. The land was a light clay loam. The previous crop was buckwheat, for which crop barnyard manure at the rate of 10 tons per acre

was spread on the surface in the winter of 1904. The land was ploughed in the fall. The crop was sown May 27 and cut August 31; Mammoth Red clover at the rate of 7 lbs., Alsike clover, 3 lbs. and Timothy seed, 12 lbs. per acre, was sown with this crop. The following is the yield obtained: 33 bushels, 6 lbs. per acre, which weighed 40 lbs. per bushel.

Three acres of mixed grain were sown on a clay loam field, that had previously been in clover a light second crop having been turned under in the fall of 1904. The ground was well worked up in the spring and sown May 17, cut August 21. With this crop was sown Mammoth Red clover at the rate of 7 lbs., Alsike 3 lbs. and Timothy seed, 12 lbs. per acre. This field gave a yield of 61 bushels per acre at 40 lbs. per bushel.

EXPERIMENTS WITH INDIAN CORN.

Twenty varieties of Indian corn were sown in rows 36 inches apart, and also in hills 36 inches apart each way. The land was a clay loam that had been manured in 1900, for a root crop grown that year, followed with grain, 1901; clover hay, 1902; grain again, 1903, and clover hay again in 1904. Stable manure at the rate of about twenty tons per acre was spread on the sod in the fall of 1904, and was ploughed under together with a heavy crop of grass. Early in June, just before planting, this was worked up into a good condition of tilth, when complete fertilizer at the rate of 300 lbs. per acre was sown broadcast and harrowed in. The corn was planted June 9, by hand machine. When the plants were about 6 inches high they were thinned out, leaving them from 4 to 6 inches apart in the rows, and from 5 to 8 plants in each hill. The land was gone over with a very light harrow before the plants came up, and three times with the Breed weeder in the next two weeks, and three times with the cultivator.

From the first this crop made very satisfactory growth, and at 60 days from coming through the ground, measured in many places 90 inches in height. The latter part of the season was not so favourable for growth. The following yields were obtained:—

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	When Tasselled.	In Silk.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
		Inches.				Tons.	Lbs.	Tons.	Lbs.
1	Thoroughbred White Flint	93	Sept. 1		Tasselled	30	1,600	24	1,500
2	Eureka	96			"	29	850	25	1,150
3	Red Cob Ensilage	98			"	28	1,200	26	800
4	Salzer's All Gold	98			"	27	670	24	1,170
5	Pride of the North	100	Sept. 1		"	27	450	26	1,900
6	Longfellow	80	Aug. 22	Sept. 1	Late milk	26	20	22	1,100
7	Early Mastodon	97	Sept. 1		Early milk	25	1,700	18	1,050
8	Selected Leaming	94	" 1		"	24	1,830	22	550
9	Giant Prolific Ensilage	96			Tasselled	24	950	21	130
10	Cloud's Early Yellow	100			"	24	70	20	1,470
11	Evergreen Sugar	88	Sept. 1		"	23	1,850	25	1,370
12	Early Butler	92	" 1		Early milk	23	1,520	21	570
13	Angel of Midnight	80	Aug. 22	Sept. 1	Late milk	22	1,460	21	350
14	Compton's Early	80	" 22	" 1	"	22	1,320	22	220
15	North Dakota White	82	" 26	" 5	In milk	22	1,100	23	200
16	King Philip	85	" 26	" 10	Watery	22	770	21	900
17	Mammoth Cuban	96	" 29		Tasselled	22	770	20	370
18	Superior Fodder	94	Sept. 29		"	22	250	19	1,270
19	Champion White Pearl	102	" 20		"	20	150	19	1,050
20	White Cap Yellow Dent	94	" 20		"	18	1,400	18	300

INDIAN CORN SOWN AT DIFFERENT DISTANCES APART.

Experiments were again carried on this year with corn planted at different distances apart. The land was similar to that in the uniform test plots, and had the same treatment. Three varieties were used. The corn was planted June 9 and cut September 27. The following table gives the names of the varieties used, the distances apart in the rows, and the yield obtained. The plots were one-fortieth acre each:—

Name of Variety.	Distance Apart.	Yield per acre.	
	Inches.	Tons.	Lbs.
Champion White Pearl	42	14	300
" "	35	17	200
" "	28	15	200
" "	21	13	100
Selected Leaming.	42	16	200
" "	35	16	900
" "	28	16	300
" "	21	14	740
Longfellow	42	20	1,500
"	35	22	1,100
"	28	21	500
"	21	18	460

FIELD CROP OF INDIAN CORN.

Three acres of Indian corn was grown in six plots of one-half acre each. The land was a clay loam in a good state of fertility, and had been in clover hay the previous year. For five of these plots the aftermath was left growing until early in June. Manure at the rate of 20 tons per acre had been spread on the grass as early as possible in the spring, and early in June this was ploughed under along with a heavy crop of grass. One plot of one-half acre was ploughed last fall and manure spread on it at the rate of 20 tons per acre this spring, and well worked in with the spade harrow before sowing, the object being to compare the results of these two methods of treatment. The variety known as Longfellow was used for this latter plot.

To one-half acre each of Compton's Early and Dakota White was added commercial fertilizer at the rate of 250 lbs. per acre, another half acre of each was left with manure alone. After ploughing, this was well worked up with disc, springtooth and smoothing harrows and sown in rows 35 inches apart with the drill seeder on June 9. The land was gone over once with a light smoothing harrow before the corn came up and cultivated with the Breed weeder and one-horse cultivator six times throughout the summer. This crop made very satisfactory growth. The following table shows the results:—

FIELD CROP OF CORN—FERTILIZER EXPERIMENT.

Name of Variety, how Fertilized, size of Plot.	Yield per Acre.
	Tons. Lbs.
North Dakota White.	
½ acre—Manure 20 tons, commercial fertilizer 250 lbs. per acre	18 1,860
½ " Manure only	17 1,460
Cost of commercial fertilizer at $30 per ton ..... $ 3.75 per acre.	
Value of gain in crop over manure only, 1 ton 400 lbs. per acre at $2 per ton ..... 2.40 "	
Loss ..... $ 1.35 "	
Compton's Early.	
½ acre—Manure 20 tons, commercial fertilizer 250 lbs. per acre	17 1,850
½ " Manure only	17 350
Cost of commercial fertilizer at $30 per ton ..... $ 3.75 per acre.	
Value of gain in crop, 1,500 lbs. at $2 per ton ..... 1.50 "	
Loss ..... $ 2.25 "	
FALL VERSUS SPRING PLOUGHING.	
Longfellow.	
½ acre—Ploughed in Fall	20 1,880
½ " Ploughed in Spring	18 290

EXPERIMENTS WITH TURNIPS.

Twenty varieties of turnips were sown this year on a clay loam soil that had been manured for roots in the season of 1900. Grain was grown in 1901, clover 1902, with the second crop turned under and grain again in 1903. Clover in 1904, the aftermath of this crop was ploughed under early last fall and cultivated twice with spade harrow. In the spring this was again cultivated with spring tooth and disc harrows. Barnyard manure was then spread on with a manure spreader at the rate of 20 tons per acre, and ploughed under and again thoroughly cultivated. Complete fertilizer at the rate of 500 lbs. per acre was then sown broadcast and harrowed in with the smoothing harrow. Rows were made 24 inches apart and the plants thinned out to one foot apart in the rows. The yield was calculated from the weight obtained from two rows each 66 feet long. The first plots were sown May 26, and a duplicate lot sown June 9, and all pulled October 16. Until about October 1 this crop appeared to be particularly good, but made little increase after that date, owing to severe and continued drouth. The following were the results obtained:—

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Magnum Bonum	43	944	1,449	4	37	632	1,243	52
2	Perfection Swede	41	688	1,378	8	29	1,128	985	28
3	Empire Swede	41	80	1,368		29	1,888	998	8
4	Hartley's Bronze	40	1,624	1,360	24	28	1,456	957	36
5	Carter's Elephant	40	256	1,337	36	22	1,904	965	4
6	Skirvings	39	1,344	1,322	24	27	1,328	922	8
7	Good Luck	39	1,040	1,317	20	28	240	937	20
8	Drummond Purple Top	39	888	1,314	48	24	1,248	820	48
9	East Lothian	39	584	1,309	44	25	1,984	866	24
10	Selected Purple Top	39	432	1,307	12	26	440	874	
11	Jumbo	38	1,824	1,297	4	31	776	1,046	16
12	Hall's Westbury	37	1,848	1,264	8	28	696	944	56
13	Bangholm Selected	37	328	1,238	48	31	624	1,043	44
14	Kangaroo	35	1,896	1,198	16	28	392	939	52
15	Elephant's Master	35	1,592	1,193	12	31	116	1,035	16
16	Mammoth Clyde	35	1,288	1,188	8	28	1,000	950	
17	Halewood's Bronze Top	35	832	1,180	32	28	1,304	955	4
18	Imperial Swede	35	376	1,172	56	27	1,936	923	16
19	New Century	34	1,008	1,150	8	26	488	874	48
20	Sutton's Champion	34	400	1,140		28	1,000	950	

FIELD CROPS OF TURNIPS.

Two and a half acres of turnips were sown in two lots of one acre each, and one lot of one-half acre. The land was a clay loam in a good state of fertility. The previous crop had been clover hay. The sod was ploughed in the fall and well worked up; it was again well worked up in the spring, and manure at the rate of 20 tons per acre spread on and ploughed under, it was then gone over with spring-tooth and disc harrows.

Each acre was divided into three parts, to one-third was added commercial fertilizer at the rate of 500 lbs. per acre, to another third at the rate of 250 lbs. per acre, and one-third left with manure alone, this was spread on the surface and harrowed in with the smoothing harrow, after which rows were run 26 inches apart, and the seed sown June 7. This crop grew exceptionally well until the early autumn, when the continued extremely dry weather retarded the growth considerably. The crop was harvested Nov. 4 and 6, with the following results:—

Field Crop of Turnips.

Name of Variety, how Fertilized, size of Plot, and date pulled.		Yield per Acre.		Yield per Acre.	
Kangaroo—(Pulled November 6).		Tons.	Lbs.	Bush.	Lbs.
¼ acre—Manure 20 tons, fertilizer 500 lbs. per acre		29	1,685	994	45
¼ " " 20 " " 250 "		29	125	968	45
¼ " " 20 " only		28	655	944	15
Cost per acre of 500 lbs. commercial fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only 50½ bush. at 6c. per bush.	3 03				
Loss per acre	$4 47				
Cost per acre of 250 lbs. commercial fertilizer at $30 per ton	3 75				
Value per acre of gain in crop over manure only 24½ bush. at 6c. per bush.	1 47				
Loss per acre	$2 28				
Best of All—(Pulled November 6.)					
¼ acre—Manure 20 tons, fertilizer 500 lbs. per acre		26	1,700	895	..
¼ " " 20 " " 250 "		25	925	848	45
¼ " " 20 " only		25	700	845	..
Cost per acre of 500 lbs. commercial fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only 50 bush. at 6c.	3 00				
Loss per acre	$4 00				
Cost per acre of 250 lbs. commercial fertilizer at $30 per ton	3 75				
Value per acre of gain in crop over manure only 3¾ bush. at 6c.	0 23				
Loss per acre	$3 52				
Hartley's Bronze—(Pulled November 4).					
¼ acre—Manure 20 tons, fertilizer 500 lbs. per acre		29	1,520	992	
¼ " " 20 " only		29	968	982	
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only 9⅕ bush. at 6c.	0 56				
Loss per acre	$6 94				

Six acres of turnips were also grown in lots of one acre each. This land varied very much, containing heavy clay loam, black muck, and sandy loam. These varieties of soil ran across the field, while the plots ran the other way. This land was in grain, 1904, hay, 1903, and was in rather a poor state of fertility. It was ploughed in the fall, worked up well this spring, after which barnyard manure at the rate of 20 tons per acre was applied with the manure spreader, after which the land was ploughed again and worked up well and sown in drills 26 inches apart. Six varieties were used. Different quantities of commercial fertilizers were used to different parts of each acre. The following table gives the particulars:—

Field Crop of Turnips—*Concluded.*

Name of Variety, how Fertilized, size of Plot, and date pulled.		Yield per Acre.		Yield per Acre.	
Sutton's Champion—(Pulled October 30).		Tons.	Lbs.	Bush.	Lbs.
⅓ acre—Manure 20 tons, bone 500 lbs. per acre		24	660	811	..
⅓ " " 20 " slag 500 "		25	520	842	..
⅓ " " 20 " no other fertilizer		24	1,080	818	..
Cost per acre of 500 lbs. bone at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 7 bush. at 6c	0 42				
Loss per acre	$7 92				
Cost per acre of 500 lbs. slag at $21 per ton	5 25				
Value per acre of gain in crop over manure only 24 bush. at 6c.	1 44				
Loss per acre	$3 81				
Kangaroo—(Pulled October 31).					
⅓ acre—Manure 20 tons, fertilizer intense 500 lbs. per acre		24	570	809	30
⅓ " " 20 " slag 500 "		24	480	808	..
⅓ " " 20 " no other fertilizer		23	1,190	786	30
Cost per acre of 500 lbs. intense fertilizer at $35 per ton	$8 75				
Value per acre of gain in crop over manure only 23 bush. at 6c.	1 38				
Loss per acre	$7 37				
Cost per acre of 500 lbs. slag at $21 per ton	5 25				
Value per acre of gain in crop over manure only 21½ bush. at 6c.	1 29				
Loss per acre	$3 97				
Best of All—(Pulled November 1).					
⅓ acre—Manure 20 tons, fertilizer intense 500 lbs. per acre		20	1,580	693	..
⅓ " " 20 " " 250 "		20	926	682	6
⅓ " " 20 " no other fertilizer		19	1,030	650	30
Cost per acre of 500 lbs. intense fertilizer at $35 per ton	$8 75				
Value per acre of gain in crop over manure only 42 bush. at 6c.	2 52				
Loss per acre	$6 23				
Cost per acre of 250 lbs. intense fertilizer at $35 per ton	4 38				
Value per acre of gain in crop over manure only 58 bush. at 6c.	3 48				
Loss per acre	$0 90				
Hartley's Bronze Top—(Pulled November 2).					
⅓ acre—Manure 20 tons, fertilizer intense 500 lbs. per acre		24	1,440	824	..
⅓ " " 20 " " " 250 "		24	1,710	828	30
⅓ " " 20 " no other fertilizer		23	200	770	..
Cost per acre of 500 lbs. intense fertilizer at $35 per ton	$8 75				
Value per acre of gain in crop over manure only 54 bush. at 6c.	3 24				
Loss per acre	$5 51				
Cost per acre of 250 lbs. intense fertilizer at $35 per ton	4 38				
Value per acre of gain in crop over manure only 58 bush. at 6c.	3 48				
Loss per acre	$0 90				
Magnum Bonum—(Pulled October 28).					
⅓ acre—Manure 20 tons, bone 500 lbs. per acre		21	1,320	720	..
⅓ " " 20 " ashes 500 "		21	990	716	30
⅓ " " 20 " no other fertilizer		21	870	714	30
Cost per acre of 500 lbs. bone at $30 per ton	$7 50				
Value per acre of gain in crop over manure only 5½ bush. at 6c.	0 33				
Loss per acre	$7 17				
Empress—(Pulled October 23).					
1 acre—Manure 20 tons		19	1,600	660	..

EXPERIMENTS WITH MANGELS.

Seventeen varieties of mangels were sown in uniform test plots. The land was a clay loam manured in 1900 for roots, followed by grain in 1901, clover and timothy in 1902, grain again in 1903, and clover hay in 1904. It was ploughed early last fall, and a light coat of aftermath turned under, it was cultivated twice before winter and again in the spring. Barnyard manure was then spread with the manure spreader at the rate of 20 tons per acre; and ploughed under and again cultivated thoroughly. Complete fertilizer at the rate of 500 lbs. per acre was then sown broadcast and harrowed in with the smoothing harrow. Rows were made 24 inches apart, rolled down and sown with the Planet Jr. hand seed drill, in bunches, 12 inches apart in the row and from 4 to 8 seeds in a bunch. When about 3 to 4 inches high they were thinned out, leaving one plant in each spot. Two sowings were made of each variety, the first sowing was on May 25 and the second on June 8. The mangels were all pulled on October 12. The yield was calculated in each case from the weight of roots gathered from two rows each 66 feet long. The following were the yields obtained:—

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs	Bush.	Lbs.
1	Mammoth Yellow Intermediate	31	1,992	1,066	32	26	744	879	4
2	Half Long Sugar White	31	1,688	1,061	28	21	256	704	16
3	Prize Mammoth Long Red.	31	776	1,046	16	21	104	701	44
4	Lion Yellow Intermediate	30	1,104	1,018	24	19	1,824	663	44
5	Giant Yellow Intermediate	30	648	1,010	48	23	360	772	40
6	Giant Yellow Globe	29	1,888	998	8	25	8	833	28
7	Selected Yellow Globe	28	1,000	950	0	25	920	848	40
8	Yellow Intermediate	28	392	939	52	19	760	646	..
9	Prize Winner Yellow Globe	27	1,632	927	12	19	1,976	666	16
10	Half Long Sugar Rosy.	27	1,328	922	8	20	280	671	20
11	Selected Mammoth Long Red	27	416	906	56	18	1,544	625	44
12	Triumph Yellow Globe	26	896	881	36	21	1,016	716	56
13	Ideal	25	8	833	28	21	560	769	20
14	Leviathan Long Red	24	1,704	828	24	15	1,920	532	..
15	Mammoth Long Red	24	1,400	823	20	18	1,848	630	48
16	Giant Sugar	24	32	800	32	17	352	572	32
17	Gate Post	23	1,272	787	52	16	72	534	32

FIELD CROPS OF MANGELS.

Two and a half acres of mangels were grown in two lots of one acre each, and one lot of one-half acre. Three varieties were used, Yellow Globe, Yellow Intermediate and Mammoth Long Red. The land was a clay loam, in a good state of fertility. The previous crop was clover hay. The sod was ploughed in the early fall and worked up twice with the spade harrow. In the spring it was again well worked up, after which barnyard manure was spread on with the manure spreader at the rate of 20 tons per acre, and ploughed under; this was then well worked up. To one-third of each acre was added commercial fertilizer at the rate of 500 lbs. per acre, to another third at the rate of 250 lbs. per acre, and one-third left with manure alone. The mangels were sown in drills 26 inches apart. They were sown June 1, and harvested October 10 to 14. The following yield was obtained:—

Name of Variety, how Fertilized, Size of Plot, Date Pulled.		Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
Yellow Intermediate—(Pulled October 13).					
⅓ acre, manure 20 tons, fertilizer 500 lbs. per acre		21	1,200	720	..
⅓ " " 250 "		24	180	803	..
⅓ " " no other fertilizer		22	820	747	..
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 27 bush. at 6 cts	1 62				
Loss per acre	$9 12				
Cost per acre of 250 lbs fertilizer at $30 per ton	$3 75				
Value per acre of gain in crop over manure only, 56 bush. at 6 cts	3 36				
Loss per acre	$0 39				
Yellow Globe—(Pulled October 10).					
⅓ acre, manure 20 tons fertilizer 500 lbs. per acre		22	700	745	..
⅓ " " 250 "		21	75	701	15
⅓ " " no other fertilizer		20	1,250	687	30
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 57½ bush. at 6 cts	3 45				
Loss per acre	$4 05				
Cost per acre of 250 lbs. fertilizer at $30 per ton	$3 75				
Value per acre of gain in crop over manure only, 13¾ bush. at 6 cts	$0 83				
Loss per acre	$2 92				
Mammoth Long Red—(Pulled October 14).					
¼ acre, manure 20 tons, fertilizer 500 lbs. per acre		20	1,360	689	20
¼ " " 20 tons, no other fertilizer		19	400	640	..
Cost per acre of 500 lbs. fertilizer at $30 per ton	$7 50				
Value per acre of gain in crop over manure only, 49⅓ bush. at 6 cts	2 96				
Loss per acre	$4 54				

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of sugar beets were sown. The land was similar to that on which the mangels and turnips were sown, and it received the same treatment. Two sowings were made of each sort, the first on May 25 and the second on June 8. The seed was sown in rows 24 inches apart, in bunches 12 inches apart in the rows. When the plants were about 3 to 4 inches high the bunches were thinned out to one plant in each place. The whole crop was harvested October 13, and the yield calculated from the weight obtained from two rows each 66 feet long.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Red Top Sugar	28	1,912	965	12	19	912	648	32
2	Danish Red Top	28	1,000	950	0	15	1,464	520	24
3	Royal Giant	27	1,176	919	36	16	1,592	559	52
4	Improved Imperial	24	336	805	36	17	960	582	40
5	Danish Improved	23	824	780	24	19	304	638	24
6	Wanzleben	16	1,592	559	52	12	168	402	48
7	Vilmorin's Improved	16	1,440	557	20	12	1,232	420	32
8	French Very Rich	14	120	468	40	11	344	372	24

EXPERIMENTS WITH CARROTS.

Ten varieties of carrots were under test. Two sowings were made of each sort, the first on May 25 and the second on June 8, in rows 24 inches apart, and thinned to about 3 inches apart in the rows. The ground was similar to that used for the turnip and mangel plots, and received the same treatment. The crop was pulled October 17. The yield was calculated from the weight of roots taken from two rows each 66 feet long. The following table gives the yield per acre obtained:—

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Short White	19	304	638	24	12	1,688	428	8
2	New White Intermediate	19	0	633	20	12	320	405	20
3	Giant White Vosges	18	1,544	625	44	11	1,712	395	12
4	Mammoth White Intermediate	18	1,392	623	12	12	1,080	418	
5	Carter's Orange Giant	18	1,240	620	40	11	344	372	24
6	White Belgian	18	784	613	4	11	1,864	397	44
7	Ontario Champion	18	24	600	24	11	344	372	24
8	Long Yellow Stump-rooted	17	808	580	8	11	800	380	
9	Early Gem	17	504	575	4	10	1,736	362	16
10	Half Long Chantenay	17	200	570		11	40	367	20

EXPERIMENTS WITH POTATOES.

Forty-one varieties of potatoes were under test this year. The land was a clay loam on which potatoes had been grown last year (1904), for which crop 20 one-horse cart loads of barnyard manure had been spread on the previous autumn and ploughed under, together with a fairly good growth of clover. Last fall this land was left without ploughing after the potatoes were dug. This spring it was worked up well with spring-tooth and spade harrow; ploughed and again worked up well. Rows were run 30 inches apart and from 3 to 4 inches deep. Potato fertilizer at the rate of 400 lbs. per acre was spread in the rows before planting. The sets were planted one foot apart in the

rows and covered with the drill plough. The tubers were cut so as to have from two to three eyes in each set. The drills were harrowed down before the plants came up, to kill the weeds, and again drilled up a few days later. The cultivator was run between the rows about once a week until the vines were quite large. The field was hoed once by hand. These plots were sprayed with Bordeaux mixture and Paris green three times.

There was no blight noticeable and no rot, but a considerable quantity of scab was observed, more than has been seen here for many years.

The potatoes were planted May 31, and dug October 3 and 4. Each plot was two rows 66 feet long and 30 inches wide. The following yields were obtained:—

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Quality.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
			Bush.	Lbs.	Bush.	Lbs.	Bush	Lbs.	
1	Vermont Gold Coin	Good	512	36	444	24	68	12	Round, flat, white.
2	Morgan Seedling	"	484	0	413	36	70	24	Oblong, pink and white.
3	Holborn Abundance	Medium	477	24	396	0	81	34	Round, white.
4	Vick's Extra Early	Good	424	36	374	0	50	36	Long, pink and white.
5	I. X. L	Medium	418	0	363	0	55	0	" "
6	Dooley	Good	413	36	380	36	33	0	Round "
7	Empire State	"	407	0	347	36	59	24	Long, round, white.
8	American Wonder	"	407	0	341	0	66	0	" "
9	Money Maker	"	387	12	330	0	57	12	" white.
10	Late Puritan	"	360	48	303	36	57	12	" pink and white.
11	Carman No. 1	"	354	12	297	0	57	12	Round, white.
12	Delaware	"	352	0	292	36	59	24	"
13	Early Elkinah	"	352	0	281	36	70	24	Oblong, pink.
14	Enormous	Medium	345	24	305	48	39	36	Round, white.
15	Rose No. 9	"	345	24	299	42	46	12	" dark pink.
16	Early White Prize	Good	345	24	272	48	72	36	Long, white.
17	Pearce	"	338	48	270	36	68	12	Oblong, pink and white.
18	Pingree	"	330	0	272	48	57	12	" white.
19	Swiss Snowflake	"	327	48	253	0	74	48	Round "
20	Country Gentleman	Medium	327	48	237	36	90	12	" pink and white.
21	Rochester Rose	"	325	36	268	24	57	12	Oblong, dark pink.
22	Penn Manor	"	325	36	253	0	72	36	Long, pink.
23	State of Maine	Good	321	12	272	48	48	24	Round, flat, white.
24	Canadian Beauty	"	319	0	264	0	55	0	Long, pink and white.
25	Carman No. 3	"	319	0	244	12	74	48	Round, white.
26	Irish Cobler	"	308	0	248	36	59	24	"
27	American Giant	"	301	24	235	24	66	0	Round, dark pink.
28	Maule's Thoroughbred	Medium	301	24	224	24	77	0	Oblong, pink.
29	Seedling No. 7	"	288	12	222	12	66	0	" dark pink.
30	Sabean's Elephant	"	275	0	209	0	66	0	" white.
31	Burnaby Mammoth	"	272	48	213	24	59	24	" pink and white.
32	Uncle Sam	Good	270	36	209	0	61	36	Round, white.
33	Everett	"	268	24	211	12	57	12	" flat, white.
34	Cambridge Russet	"	266	12	182	36	83	36	Oblong, white.
35	Dreer's Standard	"	264	0	182	36	81	24	Round "
36	Bovee	"	257	24	184	48	72	36	Oblong, pink and white.
37	Early Rose	"	244	12	178	12	66	0	Long, pink.
38	Early St. George	"	233	12	167	12	66	0	"
39	Early Envoy	"	233	12	138	36	94	36	Oblong, pink.
40	Reeve's Rose	"	222	12	162	48	59	24	"
41	Early Andes	"	217	48	151	48	66	0	Round, pink.

EXPERIMENTS IN INOCULATING CLOVER AND ALFALFA.

These experiments were carried on with seed treated and supplied from the Central Experimental Farm, Ottawa. Two half-acre plots were used for the Red clover and two for the Alfalfa, the seed for one plot in each case being treated with the culture of

bacteria, the other untreated. The land was in a poor state of fertility and supposed to be deficient in clover bacteria, as practically no clover had been grown on this land for quite a few years. For this reason this piece was selected, the claim being made that the effect of the treatment would be more clearly manifest where these bacteria were most deficient. Careful notes were taken from time to time but there was no perceptible difference between the plots sown with treated and untreated seed. A careful examination of the roots was also made and with the same results, the clover in each case having many more nodules than were found on the alfalfa.

A similar experiment was carried on in plots of one-twentieth of an acre each, on a piece of land in a good state of fertility, that had grown a crop of beans the previous year, with similar results. At present there is a good stand of both clover and alfalfa on this piece of land and it is being left without any other cover for the winter.

EXPERIMENTS WITH ALFALFA.

(Repeated from report of 1904.)

A one-fortieth acre plot of alfalfa was sown early in June, 1902, with barley as a nurse crop. The nurse crop was cut early in August. The plants only made fair growth and during the following winter were killed out excepting a few plants. These made very poor growth during the season of 1903, and now only two weak plants remain.

In 1903 a similar plot was sown early in June, wheat being used as a nurse crop, which was left uncut and allowed to remain as a protection during the winter. The alfalfa plants made a good start and nearly all came through the winter, but made very poor growth this season. A few plants of Red clover that happened by chance to get into this plot lived through the winter and made exceptionally good growth. This plot was cut twice through the summer, at which times the alfalfa was only from 4 to 6 inches high, while the few plants of Red clover in this plot were at least three times that height. The soil of these two plots was a heavy clay, underdrained, in a fair state of fertility and was well cultivated before sowing.

This season a plot of one-tenth acre of alfalfa was sown. The soil was a heavy clay, underdrained, and in a good state of fertility. This land was ploughed May 13 and well worked up. It was again worked May 29, June 20 and 29 with the spring-tooth and smoothing harrows. On July 7 this ground was again worked with the spade, spring-tooth and smoothing harrows, and alfalfa sown at the rate of 25 lbs. per acre with the grain seed drill. One-half of the plot was sown with wheat at the rate of 2 bushels per acre as a nurse crop, and the other half with alfalfa alone. The alfalfa on the plot without a nurse crop made a much more satisfactory growth than that with the nurse crop, and was much better than that of any former year. On October 20 the growth of that sown alone averaged 10 to 12 inches, and that with the nurse crop averaged only 5 to 7 inches. The nurse crop, which made a growth of about 24 inches, was allowed to remain as a protection throughout the winter.

This spring (1905) what remained of the nurse crop was removed. No particular difference was observed in the amount killed out either on that protected by the nurse crop or that unprotected, both growing fairly well in the early part of the season, that sown without the nurse crop being always considerably the best. On June 29, one one-hundredth of an acre of the best part of that which had no nurse crop was cut and weighed green, weighing 125 lbs., this being at the rate of 6¼ tons per acre, the remainder being too light to admit of being cut. An equal measure of clover cut from an adjoining field that had been sown about the same time the previous summer, gave 236 lbs., as against 125 lbs. of alfalfa.

EXPERIMENT WITH BEANS.

Three varieties of beans were sown with a view to test their relative value as a fodder plant: Common Soja beans, early Soja beans and Velvet beans. The Velvet beans did not come up, and seemed to rot in the ground. The following was the yield of the others from plots of one-thirtieth of an acre:—

Variety.	Yield per acre.
Soja beans (green)	1,035 lbs.
Soja beans (white)	475 "
Velvet beans (did not come up).	

EXPERIMENTS WITH MILLET.

Six varieties of millet were grown in plots of one-fortieth acre each. The land was a heavy clay loam in a rather poor state of fertility, not having had any manure for some years. The ground was ploughed in the fall and well worked up in the spring, and sown June 17. The crop was cut September 22. The following is the yield per acre cut green:—

Variety.	Yield per acre. Tons.	Lbs.
Italian	10	280
Algerian	6	1,200
Green California	4	1,680
Moha Hungarian	3	680
White Round French	3	200
Pearl or Cat Tail	1	600

CLOVER EXPERIMENTS.

Experiments were again conducted for the purpose of indicating the gain, if any, from clover grown with grain crops and ploughed under as a fertilizer. These experiments have been conducted on the same land for the same three years. No fertilizer except the clover has been used. The soil was a clay loam, in a fair state of fertility. Twelve plots of one-fortieth acre each were used in this experiment, four plots each of oats. wheat and barley. In two of each (six in all) Mammoth Red clover was sown with the grain at the rate of 10 lbs. per acre. On the other six plots, no clover was sown. The plots sown with clover were the same as had been sown with clover in the previous years. The ground was ploughed in the spring and sown May 27. The following yields were obtained:—

CLOVER EXPERIMENTS.

Name of Variety and how Seeded.	Yield per acre. Bus.	Lbs.
Wellman's Fife Wheat.		
No. 1 Without clover	34	20
No. 2 With clover	40	
No. 3 Without clover	39	
No. 4 With clover	41	40
Pioneer Oats.		
No. 1 Without clover	41	6
No. 2 With clover	55	10
No. 3 Without clover	60	
No. 4 With clover	60	29
Odessa Barley.		
No. 1 Without clover	32	34
No. 2 With clover	37	44
No. 3 Without clover	38	26
No. 4 With clover	42	44

SPECIAL EXPERIMENTS WITH FERTILIZERS.

Experiments with fertilizers of different kinds were continued for five years previous to 1904, it was then decided that further fertilizing of these plots should be discontinued for a time, and the land seeded to grain to determine to what extent the fertilizers already applied would continue to supply plant food for the crop. The field was seeded entirely to grain of different sorts. Two plots of each kind was sown. In one Mammoth Red clover was sown with grain, at the rate of 10 lbs. per acre, and in the other the grain was sown alone, not seeded. This is the second year that this has been done. The plots were one-eighth of an acre each. This ground was ploughed in the fall of 1904, the growth of clover was light owing to the particularly dry summer. The following yields were obtained from these plots:—

Fertilizers used each year per acre, previous to 1904.	Waverley Oats, with Clover.		Waverley Oats, without Clover.		Colorado Wheat, with Clover.		Colorado Wheat, without Clover.		Newton Barley, with Clover.		Newton Barley, without Clover.		Mixed Grain, with Clover.		Mixed Grain, without Clover.		Golden Vine Pease, with Clover.		Golden Vine Pease, without Clover.	
	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1. Manure, 30 tons	76	16	72	2	41	40	46	40	54	8	59	18	51	10	53	30	37	30	41	40
2. Manure, 15 tons, fertilizer, 250 lbs	79	14	82	12	43	20	45	..	56	12	60	20	65	..	60	..	36	40	39	10
3. Complete fertilizer, 1,000 lbs	58	28	55	30	33	20	39	10	47	44	36	22	58	30	50	..	40	..	40	50
4. " 500 lbs	61	26	67	22	36	40	31	40	45	40	43	36	57	20	56	10	33	20	25	50
5. Check. No fertilizer used	61	26	63	8	26	40	23	20	50	..	39	28	55	..	50	..	26	40	23	20
6. Bone meal, 1,000 lbs	67	22	63	8	37	30	36	40	38	26	37	24	60	..	62	20	31	40	30	..
7. " 500 lbs	58	28	70	20	36	40	30	..	39	28	33	16	52	20	55	..	30	50	31	40
8. Ashes, 2,500 lbs	62	17	73	18	39	10	40	..	52	4	56	12	58	30	60	..	35	..	30	50
9. Manure, rotted, 20 tons	75	..	79	14	40	50	35	..	48	46	46	42	61	10	65	..	30	..	25	..
10. Check. No fertilizer used	38	8	38	8	15	..	15	50	33	16	28	6	32	20	37	20	11	40	10	50
11. Land plaster, 500 lbs	41	6	44	4	15	50	17	30	25	..	29	8	35	..	40	..	21	40	18	20
12. Salt, 500 lbs	55	30	50	..	27	30	26	40	34	18	39	28	50	..	52	20	22	30	20	..
13. Marsh mud, 100 tons	67	22	64	24	30	..	28	20	51	2	41	32	56	..	55	..	23	20	21	40
14. Manure, green, 20 tons	80	30	75	..	41	40	41	..	57	14	54	8	62	20	60	..	27	30	28	20

HAY CROP.

The crop of clover and timothy on the upland was particularly good this season. Twenty-three acres yielded 57 tons, 1,340 lbs.

The hay on the marsh, owing to the breaking of dykes in this locality for the past two autumns, and the repeated overflowing of the land with salt water, was a particularly poor crop, and is likely to be so each year until the land can be reseeded with clover and timothy. Forty-nine acres yielded 64 tons, 50 lbs.

The total hay crop was 121 tons, 1,390 lbs.

SUMMARY of crops grown exclusive of uniform test plots of grain and potatoes.

Hay.

	Tons.	Lbs.
Marsh hay	64	50
Upland hay	57	1,340
	121	1,390

Grain.

	Bush.	Lbs.	Lbs.
Mixed grain	1,007	30	40,310
Oats	364	20	12,396
Barley	102	15	4,911
Wheat	20	43	1,243
			58,860

Roots.

	Tons.	Lbs.
Turnips (field crop)	204	674
Turnips (test plots	8	1,540
	213	214
Mangels (field crop)	54	15
Mangels (test plots)	5	660
	59	675

Corn.

Corn (field crop)	60	507
Corn (test plots)	8	160
	68	667

SUMMARY OF FEED USED.

SUMMARY of feeds used in connection with stock on farms, July 1, 1904, to June 30, 1905.

——	Hay.	Grain or Meal.	Corn and Roots.
	Lbs.	Lbs.	Lbs.
Grown on farm	186,095	27,893	579,377
Purchased	144,365	142,000	
On hand July 1, 1904		7,000	
Total	330,460	176,893	579,377

The meal consumed consisted of oats, 40,172 lbs.; mixed grain (oats, pease and barley), 17,327 lbs.; gluten meal, 30,000 lbs.; oil cake, 4,000 lbs.; cornmeal, 6,000 lbs.; bran, 30,000 lbs.; middlings, 38,000 lbs.; buckwheat, 3,072 lbs.; barley, 1,322 lbs.; on hand July 1, 1904, 7,000 lbs.; total, 176,893.

DISPOSITION OF FEEDS.

Disposition of feed harvested and purchased for use of live stock on farm, July 1, 1904, to June 30, 1905:—

Class Fed.	Grain or Meal.	Corn or Roots.	Hay.	Grain or Meal.	Corn or Roots.	Hay.
	Lbs.	Lbs.	Lbs.			
8 horses	40,880	.....	58,400	Weighed	Weighed	Weighed.
24 steers	26,160	202,400	63,360	"	"	"
10 young steers	3,550	54,100	11,290	"	"	"
21 cows (summer, 5 months)	7,875	9,029	15,750	Estimated	"	"
22 cows (winter, 7 months)	41,580	184,800	55,440	Weighed	"	"
23 dry cows, bulls and young stock	15,750	66,590	89,250	Estimated	"	"
Poultry	2,000	.....	.....	"		
20 sheep	3,600	2,400	7,200	Weighed	"	"
40 swine	21,000	1,000	.....	.....	"	"
Seed	7,000	.....	.....	.....		
Total account	169,395	520,319	300,690			
Amount harvested	176,893	579,377	330,460			
Shrinkage	7,498	59,058	29,770			

GRAIN AND POTATO DISTRIBUTION.

Some of the most promising varieties of grain and potatoes were again distributed for test to farmers who made application. The following number of 3 lb. bags were sent out:—

Oats	167
Barley	89
Wheat	69
Pease	41
Buckwheat	23
Potatoes	280
Total	669

HORSES.

There are at present on the farm eight horses, consisting of six heavy team horses, one express horse and one driver. There have been no changes during the year. One horse is now 23 years old, and although in good condition, will likely have to be replaced shortly. The health and condition of the horses has been good throughout the year.

CATTLE.

The stock of cattle on the farm at present consists of 71 head, as follows:—

Guernseys	5
Ayrshires	14
Holsteins	7
Grade females	27
Steers, 1 year	10
Steer calves	8

EXPERIMENTS WITH DAIRY COWS.

This experiment was carried on as in former years, to further determine the profit or loss of a fairly good dairy herd, well fed and cared for, with the feeds consumed charged at current market prices, and receiving credit for milk produced, the value of which being established by the price received at the creamery during the season.

The different feeds were charged at the following prices:—Hay, $8 per ton (average price for last few years); roots, $2 per ton; ensilage, $2 per ton; wheat bran, $19.50 per ton; gluten meal, $27 per ton; oil cake, $34 per ton; mixed grain (oats, pease and barley), $24 per ton; making an average price of mixed meal ration, as per proportion fed to cows, of 1⅗c. per lb. The ration fed to cows in full milk was: ensilage or roots, 50 lbs.; meal, 9 lbs.; hay, 12 lbs.; making a cost of 20⅗c. per cow per day.

In summer months, while milking they were charged $2.50 per month for summer feed as hereinafter explained, and when dry $1 per month.

Different quantities were fed to different cows, according to their capacity to consume or produce, or period of lactation, and charged accordingly.

When dry in winter they were charged $1 per month. From early fall until June they were kept in the stable, except on occasional fine days, when they were allowed out in the yard.

From June 1 to October, they were put out in the field the greater part of the time, night and day, but kept in during cold or wet weather.

They were fed, watered and milked each day, at as nearly regular intervals as possible.

The summer feed was practically all summer soiling crop, rye, clover or oats, pease and vetches grown together and sown at different times. After July 15 they were fed some hay, and after August 15 some green corn.

The milk of each cow was weighed at milking twice each day, and a careful record kept of the number of pounds given. The percentage of fat in the milk of each cow was determined by the Babcock milk tester, at the average of various tests taken throughout the year, and the fat, credited to the cow, on the basis that 85 pounds of fat produces 100 pounds of marketable butter.

The milk was sent to the Nappan dairy station until April 30, and the cows were credited with the butter produced at the prices paid to all patrons of that station, which averaged for the winter months 19 cents per lb. after deducting 4 cents per lb. for manufacturing and hauling milk. After this date the milk was separated at the stable, and the cream sent for a short time to the Maritime Dairy Co., Sussex, N.B., and the price credited, 22½ cents per lb., being the average price received by this creamery for the summer months, after deducting 1½ cents per lb., being the price charged for manufacturing.

The skim milk was credited to the cows at the rate of 15 cents per hundred pounds.

Twenty-two cows were in milk during the past season.

The following will show the results obtained:—

Number.	Name.	Age.	Breed.	Date of dropping last calf.	Days in Milk.	Lbs. Milk.	Fat.	Butter.	Value Sk. Milk.	Total Credit.	Cost of Feed.	Profit.
							p. c.	Lbs.	$ cts.	$ cts.	$ cts.	$ cts.
1	Corie	8 yrs.	Ay. Grade	Apl. 3,'05	300	7,200	4·0	338·82	7·20	79 47	49 40	30 07
2	Curly	6 "	Ay. G. Grade	Feb. 15,'05	285	6,400	4·1	308·70	6·40	72 25	47 54	24 71
3	Rae	4½ "	"	Jan. 15,'05	285	6,100	4·4	315·76	6·10	71 62	47 81	23 81
4	Lida Rooker	5 "	Holstein	Mar.25,'05	290	6,990	3·6	296·04	6·99	70 14	46 50	23 64
5	Ilda Rooker	6 "	"	" 1,'05	300	6,800	3·6	288·00	6·80	69 08	47 54	21 54
6	Lizzie	4½ "	Ay. G. Grade	Feb. 10,'05	260	5,300	4·3	268·11	5·30	60 93	43 37	17 56
7	Eva Rooker	10 "	Holstein	Jan. 1,'05	300	7,300	3·3	283·41	7·30	66 30	49 10	17 20
8	Rex's Maud	10 "	Guernsey	Dec. 30,'04	240	5,300	4 7	293·05	5·30	62 68	47 72	14 96
9	Sylva	2½ "	Ay. Grade	Mar. 1,'05	270	4,500	4·6	243·52	4·50	56 49	41 98	14 51
10	Stella	2½ "	"	Feb. 14,'05	285	4,800	4·4	248·47	4·80	57 80	43 37	14 43
11	Jesse	2½ "	"	Jan. 1,'05	270	5,500	4·1	265·29	5·50	59 00	44 60	14 40
12	Mossy	6 "	Jer. Grade	Feb. 1,'05	270	5,100	4·2	252·00	5·10	58 86	44 78	14 08
13	Maggie	4½ "	Ay. Grade	Jan. 15,'05	270	5,900	3·8	263·76	5·90	60 63	47 81	12 82
14	Minnie	2½ "	Ayrshire	Feb. 1,'05	300	5,040	4·1	243·10	5·04	56 90	44 78	12 12
15	Sarah	4½ "	"	" 1,'05	300	5,380	4·0	253·17	5·38	57 91	46 22	11 69
16	Flora	5 "	"	Sep. 30,'04	300	5,500	4·1	265·29	5·50	58 99	48 74	10 25
17	Nora	3½ "	"	Feb. 1,'04	270	5,210	4·0	245·17	5·21	56 08	46 22	9 86
18	Winnie	4½ "	Ay. G. Grade	Jan. 15,'04	285	5,540	3·8	247·67	5·54	56 93	47 81	9 12
19	Helen	2½ "	Ay. Grade	Feb. 10,'04	290	5,500	3·4	220·00	5·50	52 44	43 37	9 07
20	Polly	2½ "	"	" 1,'04	270	4,920	3·9	225·74	4·92	51 76	44 78	6 98
21	Beatrice	6 "	Ayrshire	Sep. 21,'04	210	5,100	3·6	216·00	5·10	46 14	43 50	2 64
22	Mamie	2½ "	"	Aug. 1,'05	120	3,250	3·4	130·00	3·25	32 50	32 00	0 50

EXPERIMENTS WITH STEERS.

Experiment *I.—Fed in Stalls vs. Fed in Loose Box.*

Sixteen steers were used for this test, in two lots of eight each, termed lot I. and lot II., containing four 2½ year old, and four 3½ year old steers in each lot. Lot I. were placed in loose boxes, and lot II. were tied up, and were, as nearly as possible, equal in form, features and weight (shorthorn grades).

The weights given are the weights taken after a fast of fourteen hours, that is, from 7 p.m. to 9 a.m the following morning. Both lots were fed alike from start to finish of this test.

They were kept in the stable all the time, except on occasional fine days, when they were let out for a time, averaging not more than once a week.

The feeds were charged at the following prices:—Hay, $8 per ton (average price for last 5 years); roots, $2 per ton; ensilage, $2 per ton; wheat bran, $19.50 per ton; gluten meal, $27 per ton; oil cake, $34 per ton; mixed grain (oats, pease and barley), $24 per ton; making an average cost of meal ration of 1⅕ cents per lb. as per proportion fed.

The steers were all dehorned immediately after beginning of the test, with a keystone clipper. No bad effects were noticed.

As a result of the decrease in weight from this operation, a very slight increase was obtained up to December 1, showing that an average of two weeks was required to regain this loss.

The result of this experiment again shows slightly more gain for those fed in loose box-stalls, than for those tied up.

Following are the results obtained:—

SESSIONAL PAPER No. 16

RECORD OF STEERS FED FROM NOV. 16, 1904, TO APRIL 30, 1905.

Steer Experiment I.

LOT I.—DEHORNED, FED IN LOOSE BOX.

Weight at Start, Nov. 16.	Gain, Dec. 1.	Gain, Dec. 31.	Gain, June 30,	Gain, Nov. 1.	Gain, Mar. 31.	Gain, April 30.	Weight at Finish, April 30.	Total Gains.
Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
8,815	50	700	525	415	280	120	10,905	2,090

LOT II.—DEHORNED, TIED IN STALLS.

8,940	45	675	490	465	200	135	10,950	2,010

Rations and Cost Per Day for One Steer for Entire Period.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total.
		$ cts.	$ cts.	$ cts.
Nov. 16 to Dec. 1	Roots, 90 lbs	0 09	1 35	
	Hay, 10 lbs	0 04	0 60	
	Meal, 2 lbs	0 $02\frac{2}{5}$	0 42	
				2 37
Dec. 1 to Dec. 31	Roots, 60 lbs	0 06	1 80	
	Hay, 10 lbs	0 04	1 20	
	Meal, 3 lbs	0 $03\frac{3}{5}$	1 08	
				4 08
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 10 lbs	0 04	1 20	
	Meal, 4 lbs	0 $04\frac{4}{5}$	1 44	
				3 84
Jan. 30 to Mar. 1	Roots, 30 lbs	0 03	0 90	
	Hay, 12 lbs	0 $64\frac{4}{5}$	1 44	
	Meal, 5 lbs	0 06	1 80	
				4 14
Mar. 1 to Mar 31	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs	0 06	1 80	
	Meal, 6 lbs	0 $07\frac{1}{5}$	2 16	
				4 56
Mar. 31 to April 30	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs	0 06	1 80	
	Meal, 7 lbs	0 $08\frac{2}{5}$	2 52	
				4 92
Cost of feed one steer, 165 days				23 81

SUMMARY OF EXPERIMENT WITH STEERS.

FINANCIAL PART.

Original weight of 16 steers, 17,755 lbs. at 4c. per lb.	$ 710 20
Weight at finish, 16 steers, 21,855 lbs. at 5 36/100 per lb.	1,171 42
Balance	$ 461 22
Cost of feed for lot, 165 days	382 56
Net profit	$ 78 66
Daily rate of gain per steer	lbs. 1·55
Cost of 1 lb. gain	cts. 9·33
Cost of feed per day per steer	cts. 14·49

Profit per steer, $4.91.

EXPERIMENTS WITH STEERS.

EX. II.—INFLUENCE OF AGE ON COST OF BEEF.

This experiment was carried on with a view to gain some data as to the influence of age upon the cost of production of beef.

Three lots of animals, of as nearly uniform type and breeding as possible, were selected for this test, consisting of eight 3-year olds, termed lot I; eight 2-year olds, termed lot II.; and eight yearlings, termed lot III.

The prices charged for feed consumed were the same as in 'Experiments with steers, Ex. I.'

They were all dehorned two weeks previous to beginning of test, and had evidently quite recovered from the effects of the operation at beginning of test, December 1.

The following tables will show the amounts fed and results obtained:—

EX. II.—LOT I.—THREE YEAR OLD STEERS.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs	0 06	1 80	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 3 lbs	0 03 3/5	1 08	
				4 08
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 4 lbs	0 04 4/5	1 44	
				3 84
Jan. 30 to Mar. 1	Roots, 30 lbs	0 03	0 90	
	Hay, 12 lbs.	0 04 4/5	1 44	
	Meal, 5 lbs.	0 06	1 80	
				4 14
Mar. 1 to Mar. 31	Roots, 20 lbs.	0 02	0 60	
	Hay, 15 lbs.	0 06	1 80	
	Meal, 6 lbs.	0 07 1/5	2 16	
				4 56
Mar. 31 to April 30	Roots, 20 lbs.	0 02	0 60	
	Hay, 15 lbs.	0 06	1 80	
	Meal, 7 lbs.	0 08 2/5	2 52	
				4 92
Cost of feed 1 steer 150 days				21 54
" 8 steers 150 days				172 32

	Lbs.
Weight of 8 steers, Dec. 1, 1904	9,110
Weight of 8 steers, April 30, 1905	11,075
Gain	1,960

Daily rate of gain	lbs. 1·6375
Cost of feed per day	cts. 14·36
Cost of 1 lb. gain	cts. 8·76

EX. II.—LOT II.—TWO YEAR OLD STEERS.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs.	0 06	1 80	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 3 lbs	0 3⅗	1 08	
				4 08
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 10 lbs	0 04	1 20	
	Meal, 4 lbs.	0 04⅘	1 44	
				3 84
Jan. 30 to Mar. 1	Roots, 30 lbs	0 03	0 90	
	Hay, 12 lbs.	0 04⅘	1 44	
	Meal, 5 lbs.	0 06	1 80	
				4 14
Mar. 1 to Mar. 31	Roots, 20 lbs.	0 02	0 60	
	Hay, 15 lbs.	0 06	1 80	
	Meal, 6 lbs.	0 07⅕	2 16	
				4 56
Mar. 31 to April 30	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs.	0 06	1 80	
	Meal, 7 lbs.	0 08⅖	2 52	
				4 92
Cost of feed 1 steer 150 days				21 54
" 8 steers 150 days				172 32

	Lbs.
Weight of 8 steers, Dec. 1, 1904	8,740
Weight of 8 steers, April 30, 1905	10,780
Gain	2,040

Daily rate of gain per steer	lbs. 1·70
Cost of feeding per day per steer	cts. 14·36
Cost of 1 lb. gain	" 8·44

Ex. II.—Lot III.—Year Old Steers.

Period.	Daily Ration.	Daily Cost.	Cost for period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs.	0 06	1 80	
	Hay, 8 lbs.	0 03$\frac{1}{5}$	0 96	
	Meal, 3 lbs.	0 03$\frac{3}{5}$	1 08	
				3 84
Dec. 31 to Jan. 30	Roots, 40 lbs.	0 04	1 20	
	Hay, 8 lbs.	0 03$\frac{1}{5}$	0 96	
	Meal, 4 lbs.	0 04$\frac{4}{5}$	1 44	
				3 60
Jan. 30 to March 1	Roots, 30 lbs.	0 03	0 90	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 4 lbs.	0 04$\frac{4}{5}$	1 44	
				3 54
March 1 to March 31	Roots, 20 lbs.	0 02	0 60	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 5 lbs.	0 06	1 80	
				3 60
March 31 to April 30	Roots, 20 lbs.	0 02	0 60	
	Hay, 10 lbs.	0 04	1 20	
	Meal, 6 lbs.	0 07$\frac{1}{5}$	2 16	
				3 96
Cost of feed 1 steer 150 days				18 54
" 8 steers "				148 32

	Lbs.
Weight of 8 steers, Dec. 1, 1904	7,640
Weight of 8 steers, April 30, 1905	9,740
Gain	2,100
Daily rate of gain per steer ..lbs.	1·75
Cost of feed per day per steer ..cts.	12·36
Cost of 1 lb. gain "	7·06

COMPARISON OF EXPERIMENTS WITH STEERS.

EXPERIMENT II.

	Lot 1, 3-yr. old.	Lot 2, 2-yr. old.	Lot 3, year-old.
Daily rate of grain per steer	1 6375 lbs.	1·70 lbs.	1·75 lbs.
Cost of feed per day "	14·36 cts.	14·36 cts.	12·36 cts.
Cost of 1 lb. gain	8·76 "	8·44 "	7·06 "

STEER CALF EXPERIMENT.

This experiment which was started in May, 1901, with ten calves, in two lots of five each, to determine the comparative economy of feeding calves a 'full fattening ration' as contrasted with a 'limited growing ration,' was continued from November 30, 1904, with animals termed lot II., Ex. II., and lot I., Ex. III., finished and sold April 30 and May 31, 1905. Ex. IV., lots I. and II. were also continued.

The following tables show the results:—

Ex. II.—Lot II.—Calves of May, 1902, Continued from December 1, 1904.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 90 lbs	0 09	2 70	
	Hay, 10 lbs	0 04	1 20	
	Meal, 3 lbs	0 03$\frac{3}{5}$	1 08	
				4 98
Dec. 31 to Jan. 30	Roots, 60 lbs	0 06	1 80	
	Hay, 10 lbs	0 04	1 20	
	Meal, 4 lbs	0 04$\frac{4}{5}$	1 44	
				4 44
Jan. 30 to March 1	Roots, 60 lbs	0 06	1 80	
	Hay, 12 lbs	0 04$\frac{4}{5}$	1 44	
	Meal, 6 lbs	0 07$\frac{1}{5}$	2 16	
				5 40
March 1 to March 31	Roots, 40 lbs	0 04	1 20	
	Hay, 12 lbs	0 04$\frac{4}{5}$	1 44	
	Meal, 6 lbs	0 07$\frac{1}{5}$	2 16	
				4 80
March 31 to April 30	Roots, 30 lbs	0 03	0 90	
	Hay, 15 lbs	0 06	1 80	
	Meal, 8 lbs	0 09$\frac{3}{5}$	2 88	
				5 58
April 30 to May 30	Roots, 20 lbs	0 02	0 60	
	Hay, 15 lbs	0 06	1 80	
	Meal, 10 lbs	0 12	3 60	
				6 00
Cost of feed, one steer, 180 days				31 20

Lot 2.	Weight at start.	Weight at finish.	Gain.
	Lbs.	Lbs.	Lbs.
Dec. 1 to May 30	5,475	6,800	1,325

Daily rate of gain per steer	lbs.	1·47
Cost of feed per day per steer	cts.	17·73
Cost of 1 lb. gain	"	11·77
Cost of feed for lot, 180 days		$156 00

EX. III.—LOT I.—CONTINUED FROM DECEMBER 1, 1904.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 60 lbs	0 06	1 80	
	Hay, 8 lbs	0 03 1/5	0 96	
	Meal, 3 lbs	0 03 3/5	1 08	
				3 84
Dec. 31 to Jan. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 8 lbs	0 03 1/5	0 96	
	Meal, 4 lbs	0 04 4/5	1 44	
				3 60
Jan. 30 to March 1	Roots, 30 lbs	0 03	0 90	
	Hay, 10 lbs	0 04	1 20	
	Meal, 4 lbs	0 04 4/5	1 44	
				3 54
March 1 to March 31	Roots, 20 lbs	0 02	0 60	
	Hay, 10 lbs	0 04	1 20	
	Meal, 5 lbs	0 06	1 80	
				3 60
March 31 to April 30	Roots, 20 lbs	0 02	0 60	
	Hay, 10 lbs	0 04	1 20	
	Meal, 6 lbs	0 07 1/5	2 16	
				3 96
Cost of feed, one steer, 150 days				18 54

Lot 1.	Weight at start.	Weight at finish.	Gain.
	Lbs.	Lbs.	Lbs.
Dec. 1 to April 30	4,820	6,535	1,715

Daily rate of gain per steer	lbs.	2·28
Cost of feed per day per steer	cts.	12·36
Cost of 1 lb. gain	"	5·40
Cost of feed for lot, 150 days		$92 70

Ex. IV.—Lot I.—Calves of May, 1904, Continued from December, 1904.

Period.	Daily Ration.	Daily Cost.	Cost for Period.	Total Cost.
		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec. 31	Roots, 15 lbs	0 01½	0 45	
	Hay, 2½ lbs	0 01	0 30	
	Meal, 2 lbs	0 02⅖	0 72	
				1 47
Dec. 31 to Jan. 30	Roots, 20 lbs	0 02	0 60	
	Hay, 2½ lbs	0 01	0 30	
	Meal, 2 lbs	0 02⅖	0 72	
				1 62
Jan. 30 to March 1	Roots, 25 lbs	0 02½	0 75	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 2 lbs	0 02⅖	0 72	
				1 95
March 1 to March 31	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 2 lbs	0 02⅖	0 72	
				2 10
March 31 to April 30	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 2 lbs	0 02⅖	0 72	
				2 10
April 30 to May 30	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 2 lbs	0 02⅖	0 72	
				2 10
May 30 to Sept. 1	Meal, 1 lb	0 01⅕	1 11⅗	
	Pasture at		$1 per month	
				4 11⅗
Sept. 1 to Oct. 1	Green feed, 40 lbs	0 04	1 20	
	Meal, 2 lbs	0 02⅖	0 72	
				1 92
Oct. 1 to Nov. 1	Green feed, 40 lbs	0 04	1 24	
	Meal, 2 lbs	0 02⅖	0 74⅖	
				1 94⅗
Nov. 1 to Dec. 1	Roots, 40 lbs	0 04	1 20	
	Hay, 5 lbs	0 02	0 60	
	Meal, 2 lbs	0 02⅖	0 72	
				2 52
Cost of feed, one steer, 1 year				21 84

Lot. 1.	Weight at start.	Weight at finish.	Gain.
Period.	Lbs.	Lbs.	Lbs.
Dec. 1 1904 to Dec. 1 1905	2,650	4,815	2,165

Daily rate of gain per steer	lbs.	1·18
Cost of feed per day per steer (winter)	cts.	6·60
" " " (summer)	"	5·32
" " " 1 year	"	5·98
Cost of 1 lb. gain	"	5·04
Cost of feed for lot, 1 year		$109 20

EX. IV.—LOT II.—CALVES OF MAY, 1904, CONTINUED FROM DECEMBER, 1904.

Lot. II.	Daily Rations.	Daily Cost.	Cost for Period.	Total Cost.
Period.		$ cts.	$ cts.	$ cts.
Dec. 1 to Dec 31	Roots, 20 lbs	0 02	0 60	
	Hay, 2 lbs	0 00⅘	0 24	
	Meal, ½ lb	0 00⅗	0 18	
				1 02
Dec. 31 to Jan. 30	Roots, 25 lbs	0 02½	0 75	
	Hay, 2 lbs	0 00⅘	0 24	
	Meal, ½ lb	0 00⅗	0 18	
				1 17
Jan. 30 to Mar. 1	Roots, 25 lbs	0 02½	0 75	
	Hay, 2½ lbs	0 01	0 30	
	Meal, ½ lb	0 00⅗	0 18	
				1 23
Mar. 1 to Mar. 31	Roots, 30 lbs	0 03	0 90	
	Hay, 2½ lbs	0 01	0 30	
	Meal, ½ lb	0 00⅗	0 18	
				1 38
Mar. 31 to Apl. 30	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅖	0 48	
	Meal, ½ lb	0 00⅗	0 18	
				1 56
Apl. 30 to May 30	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅗	0 48	
				1 38
May 30 to Oct. 1	Pasture at		4 00	
				4 00
Oct. 1 to Oct. 30	Roots, 30 lbs	0 03	0 90	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 1 lb	0 01⅕	0 36	
				1 74
Oct 31 to Nov. 30	Roots, 40 lbs	0 04	1 20	
	Hay, 4 lbs	0 01⅗	0 48	
	Meal, 1 lb	0 01⅕	0 36	
				2 04
Cost of feed, 1 steer, 1 year				15 52

	Weight at start.	Weight at finish.	Gain.
Dec. 1, 1904, to Dec. 1, 1905	2,015 lbs.	3,480 lbs.	1,465 lbs.

Daily rate of gain per steer ..... lbs. ·80
Cost of feed per day per steer (winter) ..... cts. 4·60
" " (summer) ..... cts. 3·82
" " 1 year ..... cts. 4·25
Cost of 1 lb. gain ..... cts. 5·29
Cost of feed for lot, 1 year $77 60

COMPARISON OF STEER-CALF EXPERIMENTS.

Full feeding ration vs. light feeding ration, from birth to block.

Since May, 1901, experiments have been carried on each year to determine the comparative economy of feeding calves a 'full fattening ration' from the start, as contrasted with a 'limited growing ration.'

Each of the lots of 'full fattening ration' were sold when two years old, the lots on 'limited growing ration' in each case were continued until 3 years old before being sold.

Following is a summary of results obtained:—

	Full Fattening Ration.				Limited Growing Ration.		
	1901.	1902.	1903.		1901.	1902.	
—	Ex. I. Lot I. — 5 Steers.	Ex. II. Lot I. — 5 Steers.	Ex. III. Lot I. — 5 Steers.	Average of 15 Steers.	Ex. I. Lot II — 5 Steers.	Ex. II. Lot II. — 5 Steers.	Average of 10 Steers.
	Per Steer.	Per Steer.	Per Steer.		Per Steer.	Per Steer.	
Number of days fed	713·	683·	515·	637·	1108·	1108·	1108·
Weight when put on experiment	166·	191·	579·	312·	153·	121·	137·
Weight when slaughtered	1271·	1246·	1307·	1272·	1306·	1360·	1333·
Daily rate of gain	1·54·	1·54·	1·41·	1·49·	1·04·	1·11·	1·075
Amount meal eaten	1804·	1633·	1328·	1588·	1549·	1419·	1484
" hay "	2590·	2164·	2310·	2355·	3470·	4489·	3979·
" roots "	14725·	13360·	13500·	13861·	24695·	23762·	24228·
" straw "	.....	.....	.....	.....	597·	600·	598·
" skim-milk eaten	1712·	1742·	.....	1727·	2080.	2320·	2200·
" whole milk eaten	728·	698·	.....	713.	360·	120·	240·
" pas ure "	3 months.	.....	2½ months.	11 weeks.	10 months.	10 months.	10 months.
" green feed "	1240·	4300·	3080·	2873·	.....	.....	.....
Cost of feed from birth to block	$65 47	$58 35	$43 00	$55 60	$72 00	$73 91	$72 95
Cost of 100 lbs. increase live weight	$ 5 92	$ 5 53	$ 5 90	$ 5 78	$ 6 24	$ 5 96	$ 6 10

SWINE.

The herd of pigs at present on the farm consists of Yorkshires, Berkshires and their grades and crosses, in all 49 head, as follows:—1 Yorkshire boar, 3 Yorkshire sows, 2 Berkshire sows, 3 grade sows, 10 grade pigs 6 months old, 30 grade pigs 1 to 3 months old.

EXPERIMENTS WITH SWINE.

Pasture vs. feeding in pens.

This experiment was again carried on as in past years, with two lots of 10 pigs each, as evenly divided as to age and weight as possible, being equal numbers from each litter and from 1 to 2 months old.

This experiment was commenced on July 1, with lot I. on pasture and lot II. fed inside.

They were fed equal amounts of milk and meal, consisting of shorts and buckwheat.

The pasture consisted of clover, rape and hairy vetch on different parts of the field, and the pigs were changed from time to time.

A portable house was used for shelter.

From October 1 to November 15 all were fed alike in pens.

Following are the results:—

Lot 1.—Fed on pasture July 1 to October 1. Fed in pens October 1 to November 15.

Period.	Lot I.		
	Weight at Start.	Weight at Finish.	Gain.
	Lbs.	Lbs.	Lbs.
July 1 to October 1	235	925	690
October 1 to November 15.	925	1,510	585

Average daily gain on pasture, July 1 to October 1. . . . . lbs. ·74
" in pens, October 1 to November 15. . . . lbs. 1·30
" 137 days. . . . . lbs. ·93

Lot II.—Fed in pens, July 1, to November 15, 1905.

Period.	Lot II.		
	Weight at Start.	Weight at Finish	Gain.
	Lbs.	Lbs.	Lbs.
July 1 to October 1	245	1,073	828
October 1 to November 15	1,073	1,500	427

Average daily gain in pens, July 1 to October 1 . . . . . lbs. ·90
" " October 1 to November 15 . . . . lbs. ·948
" " 137 days . . . . . lbs. ·916

SHEEP.

The flock of sheep at present on the farm consists of 7 Leicesters, 11 Shropshires and 4 grades, as follows:—

1 pure bred Leicester ram.
6 pure bred Leicester ewes.
7 pure bred Shropshire ewes.
4 pure bred Shropshire ewe lambs.
3 grade ewes.
1 grade ewe lamb.

POULTRY.

The stock of poultry on hand at present consists of B. P. Rocks, White Wyandottes, White Leghorns, Black Minorcas and Buff Orpingtons.

During the month of November a number of old and undesirable birds were disposed of, and a number of cockerels of the different breeds sold to farmers for breeding purposes, leaving the stock on hand as follows:—

Breed.	Hens.	Cocks.	Pullets.	Cockerels.
B. P. Rocks	4	1	16	2
W. Wyandottes	..	..	8	1
W. Leghorns	2	..	3	1
Black Minorcas	5	..	2	1
Buff Orpingtons	..	..	8	..

All have kept quite healthy, and 75 chicks were raised during the season.

Very few eggs were laid previous to March 1, owing to the fact that the hens were all at least one year old, no pullets having been kept last season.

The number of eggs laid by the different breeds up to July 1 is as follows:—

	Eggs laid.
12 B. P. Rocks	775
4 Blk. Minorcas	225
4 W. Leghorns	250
4 White Wyandottes	199

BEES.

Bee-keeping in the maritime provinces has in the past received very little attention, and believing that they confer great benefits to the orchards from the carrying of pollen, besides their value as a revenue producer, further experiments with bees have been made.

On May 22, two colonies were received from the experimental farm at Ottawa, weighing 42½ and 38½ pounds respectively. Quite a number of dead bees were found in each, particularly in the lighter hive. One appeared to be in excellent condition, the other appeared only fairly strong, with little brood in the frames in the latter hive. As the weather continued cold and wet, and not at all favourable to honey gathering, it was considered wise to somewhat retard the stronger hive, and at the same time strengthen the weaker one by removing one frame well filled with brood from the stronger hive, and replacing it with empty frame from the weaker one. This was done on June 14.

From these, four swarms were secured, the first on June 22, second on July 5, third on July 7, and fourth on August 3.

Until after July 3, very little honey was gathered. From July 4 until August 5, all hives gained rapidly in weight, except one parent hive which had swarmed twice. This weak hive continued to dwindle until August 15, when it was completely deserted. After August 9, very little surplus honey was stored by any.

Fifty pounds of honey was taken from those hives August 25; this leaves for winter quarters five hives weighing respectively 55, 53, 54, 59 and 40 pounds.

On November 18 they were placed in the cellar of the superintendent's house, in the corner farthest from the door. This corner was partitioned off with matched lumber for the double purpose of keeping out light and keeping the temperature more uniform, which is at present from 40° to 45°.

The hives were placed on a shelf, one foot from the ground, and rested on 3 empty boxes.

A three-inch block was placed in front, between the bottom board and the brood chamber, making the full entrance three inches high across the front. The wooden covers were removed and replaced with chaff cushions four inches thick, and lapping the sides and ends four inches.

CORRESPONDENCE.

During the year 2,080 letters were received at this Farm, and 1,812 sent out, exclusive of circulars sent with grain distribution and reports.

AGRICULTURAL MEETINGS.

During the year I attended and delivered addresses at the following meetings:—Winter Fair, Amherst, N.S., December 12 to 15, 1904; Short Course Judging, Truro, N.S., February 23; Nova Scotia Farmer's Association, Truro, N.S., February 27; Dairy School, Sussex, N.B., March 6 to 25; Agricultural meetings at Pugwash, N.S., April 26; Williamsdale, N.S., April 28; Lower Millstream, N.B.

EXHIBITIONS.

An exhibit of the products of the farm was made at Nova Scotia Provincial Exhibition, Halifax, N.S., September 13 to 21; Fredericton, N.B., September 21 to 27; Yarmouth, October 4 and 5. Those exhibits have always been very much appreciated.

VISITORS.

As usual many visitors have been on the farm this year, the largest gathering being the Cumberland County Agricultural Society, July 15.

I have the honour to be, sir,

Your obedient servant,

R. ROBERTSON,

Superintendent.

REPORT OF THE HORTICULTURIST.

(W. S. Blair.)

Nappan, N.S., November 30, 1905.

To Dr. Wm. Saunders, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

Sir,—I have the honour to submit herewith a report of some of the work done in the Horticultural Department of the Experimental Farm for the maritime provinces during the year 1905.

The winter of 1905 was a severe one and the months of January and February were accompanied by an unusual fall of snow. The fruit and ornamental trees did not suffer from winter killing, but on account of snow drifting over them many were more or less injured by being broken when the snow settled. This trouble, however, was overcome in many cases by shovelling the snow away from a number of the fruit trees that were liable to injury, and in this way the branches were relieved of the heavy weight of snow. Some orchards in these provinces suffered greatly from being broken by the snow which drifted in some cases 10 to 15 feet deep around them, so that when the snow settled trees were in many instances practically stripped of branches.

The early spring was exceptionally late and backward, retarding the blossoming of fruit trees several days. The mean average temperature for May was 1° lower than the average for the past 5 years: For June 1½° lower than that of the past 5 years. The month of July was up to the average in temperature, and August was about 1° lower than the mean average for the past 5 years. September, on the other hand, was somewhat warmer than that of the past 5 years by about ½° in the mean average. The following table gives the mean average temperature for the months of May, June, July, August and September for the past 5 years as compared with that of this season. The rainfall during these months for the past 3 years is also given:—

Month.	Mean Temperature at Nappan.		Rainfall.		
	Average, 5 Years.	1905.	1905.	1904.	1903.
			Inches.	Inches.	Inches.
May	48·04°	47·07°	3·02	1·76	0·68
June	56·06°	54·52°	3·30	1·74	2·29
July	64·22°	64·25°	1·56	2·15	2·07
August	62·32°	61·41°	1·53	3·51	2·40
September	56·08°	55·53°	3·38	4·52	3·63
Total			14·03	13·68	11·07

The latter part of June and the first half of July was practically ideal weather for all crops. The summer, however, continued too dry after the middle of July and during August for crops to develop properly. Good cultivation during the early part

of the season up to the middle of July very materially controlled the moisture supply, and fruit trees so treated apparently suffered little for want of moisture.

The only frosts in May were on the 2nd, 5th, 12th, 13th, 16th, and 23rd, when 32°, 27°, 28°, 22°, 31°, and 31° were recorded, respectively. The only June frost was on the 7th, when 5° was registered. This frost did considerable damage to fruits in blossom at the time; tender plants that had been set out, and to grape vines. The apple blossoms here were not sufficiently advanced to be injured, but cherries and plums suffered so materially that no fruit set. The apples in blossom in the Annapolis and Cornwallis valleys and in other parts of the province of Nova Scotia at this time were greatly injured by the frost. We escaped the usual September frost, although in some sections of the provinces a great amount of damage was done by a frost on August 15, and also by a September frost. The first fall frost recorded here was 5° on October 1.

The apple crop on the Nappan farm was much in advance of that secured in the past. The trees produced a good crop of excellent fruit. The apples developed better than they ever had done before. Many of the trees are of Russian origin, and lack in quality. For cooking purposes most of the Russian sorts are excellent. A number of varieties, such as Scott's Winter, Winesap, Jonathan, Missouri Pippin and Occident produce fruit that averages small and is not very marketable. The Gano, Wealthy and Yellow Transparent are inclined to overbear, and should have the fruit thinned, especially when the trees are young, otherwise it will be small and the trees are liable to be broken from an overweight of fruit.

A report is herewith submitted of some of the varieties of apples that have fruited here.

The strawberry crop was fairly good. The bush fruits were a fair crop.

The ornamental trees and shrubs have made good growth. One hedge of Sea Buckthorn (*Hippophæ rhamnoides*) was set in 1905, in place of Red-leaved Rose (*Rosa rubrifolia*), which made a poor hedge and was removed.

I beg to acknowledge the following donations: From Mr. Frank G. Semple, Brule, N.S. strawberry plants of 'Nick Ohmer,' 'Sample,' 'Splendid' and 'Brandywine.' From Mr. C. W. Smith, Sand Beach, N.S., seedling strawberry plants. From Templin & Co., Calla, Ohio 1 doz. 'Cardinal' strawberry plants. From Mr. Thomas A. Peters, Deputy Minister of Agriculture, Fredericton, N.B., scions of yellow plum which originated near Fredericton. From J. C. Gilman, Esq., Fredericton, N.B., scions of Cranberry Pippin apple. From Mr. F. G. Semple, Brule, N.S., scions of Winter Rose apple. I am also indebted to Mr. W. T. Macoun, Horticulturist, Central Experimental Farm, Ottawa, for 40 additional varieties of strawberry.

I addressed several agricultural meetings in the maritime provinces during the year.

APPLES.

Aport.—Two trees of this variety were planted in 1890. This variety is of Russian origin and is identical with the Emperor Alexander. They have made strong growth, and produced the first crop of any consequence in 1904 when the trees averaged 31½ pecks each. The same trees averaged only 8 pecks in 1905.

Alexander.—Synonym, Emperor Alexander. Three trees were set in 1890. This is a well known strong growing variety. The first crop of any quantity was in 1903 when the trees averaged 8 pecks. In 1904 they averaged 12 pecks, and in 1905, 29·33 pecks. It will be noticed that these three trees are much more regular bearers than the two above called Aport.

Allen's Choice.—One tree only planted in 1893 a strong grower. Fruited in 1905, 2 pecks. The fruit is of medium size, oblate, yellow skin covered over nearly the whole surface with red and striped. Quality good; season January; too small to be of much commercial value here.

Anis.—The variety we have under this name is identical with Yellow Transparent. Two trees set in 1890. These have fruited every other year since 1894. The yield in 1904 was the first large crop, when they averaged 4 bushels each. They produced no fruit this year.

Antonovka.—Two trees of this Russian sort were set in 1897. The fruit is large, yellow, oblong, conical. It is a good cooking sort, and will keep until December. The first large crop was in 1904, when the trees averaged 2¼ pecks. In 1905, 15½ pecks per tree. This variety has no special commercial value.

Arabka.—Synonyms, Arabka Winter and Arabskoe. Two of the former and two of the latter were planted in 1897. They have made strong growth. The first crop of consequence was produced in 1903, when the trees averaged 3·75 pecks. In 1904 they produced an average of 7·94 pecks, and in 1905, 13 pecks. The fruit is large, round, conical, with a green, purplish-red skin. The flesh is greenish white. It is only valuable for cooking; season January. Useful in northern sections where fruit of better quality is tender.

Anisovka.—One tree of this variety was planted in 1890. This is a strong upright grower. The fruit drops badly just as it is about in condition to pull, which is a decided disadvantage. This tree has been top grafted. The fruit is above medium size, roundish, oblate, skin greenish-yellow, streaked and splashed with red. The flesh is crisp and pleasant. Quality good; season September and October.

Ananasnœ.—This is not true to name. It is the same as Anisovka. Two trees were set in 1890. They have fruited well during the past three years. In 1903 they averaged 11 pecks, in 1904, 4 pecks, 1905, 22 pecks. These trees drop their fruit badly just as ripe, otherwise it is a good autumn variety.

Banks.—Synonym, Bank's Gravenstein, Red Gravenstein. This apple is similar in every respect to the well known Gravenstein, except that it is more striped and splashed with red over the yellow skin. Two trees were planted in 1895, and two in 1898. Three of these have since died and the one remaining is not making strong growth. Sunscald and collar rot have been the principal cause of failure. A slight killing back of branches was noted one year. The one tree living, planted in 1898, produced 1 peck of apples this year.

Basil the Great.—Two trees supposed to be this variety were set in 1897. These have made strong growth. The fruit produced, however, show that the trees are Pointed Pipka. In 1903 these two trees averaged 2¾ pecks; 1904, 13½ pecks, and 1905, 16¼ pecks. See Pointed Pipka.

Baxter.—Synonym, La Rue, Baxter's Red. Two trees were set in 1898. They have made fairly strong growth. The trees produced a few apples in 1903-04 and 1905. The growth of this tree is very upright. The fruit is large, round, conical. The skin is yellow, covered over nearly the whole surface with red, and striped with red. This is a promising variety. The fruit is handsome and above the average in quality. Season, December and January.

Beautiful Arcade.—Two trees were set in 1898. They have made good growth. The fruit is round, oblong, with greenish yellow skin. The quality is good. Different from the majority of Russian apples. The flesh is sweet, rich, melting, juicy. Season, September. Fruited, giving only a few specimens in 1904-05.

Bell Pippin.—Two trees were planted in 1897. They have made good growth. The fruit is large, oblate, conical and ribbed; skin greenish yellow, somewhat striped with red. Flesh greenish-yellow; quality fair. Season, December and January. Fruited in 1904, the trees averaging 1 peck. In 1905 they averaged 7½ pecks.

Ben Davis.—Two trees were set in 1893. They have made strong growth, but have not produced well-matured fruit. This is a well known variety which needs no description. The trees averaged 8½ pecks in 1903; 4 pecks in 1904, and in 1905 21 pecks.

Benoni.—Two trees were set in 1890. They have made very strong growth. The tree is a vigorous upright grower. The fruit is small to medium, roundish, oblate, conical. The skin is yellow, red, striped with crimson. Quality very best. This is a variety that is inclined to produce abundantly every second year. The fruit should be thinned on the tree in order to secure a good percentage of marketable fruit. This variety is one of the best hardy dessert apples. Season, October and November. It seems to do well in northern sections, being apparently as hardy as the Duchess, and equal in quality to the Gravenstein. One tree produced ½ peck in 1903; 31 pecks in 1904, and 2 pecks in 1905. The other tree produced 5 pecks in 1903; 1½ pecks in 1904, and 30 pecks in 1905.

Bethel.—Synonym, Uncle Sam. One tree set in 1897 produced the first crop this season, giving 18 pecks. Fruit round, conical, medium to large. Skin greenish-yellow, striped with red. Quality fair. Keeps until March, but looses its character early in the winter. A very hardy strong growing tree. Useful in the colder sections as a hardy winter variety.

Bismark.—One tree planted is making poor growth. Fruit has been produced from grafts. It is medium to large, round, conical. Skin green, striped with red over part of the surface. Quality fair. Season, January. As grown here this variety is not of special value.

Blue Pearmain.—Two trees were set in 1890. These have made strong growth. The fruit is round, conical, medium to large. Skin dark purplish red, striped on crimson ground. Quality good. Season, January and February. This is a good winter variety. One yielded in 1903, 2 pecks; 1904, 9 pecks; 1905, none. The other produced in 1903, 16 pecks; 1904, 13½ pecks, and 1905, 27 pecks.

Borovinka.—This is a Russian variety identical with Duchess of Oldenburg in every particular, except that the fruit does not mature as early by one week. The fact that this variety is a few days later than Duchess makes it possible to extend the season of that apple a little longer. The yield in 1903 was 12 pecks; 1904, 17½ pecks; 1905, 1 peck.

Bottle Greening.—One tree was set in 1891. A strong grower. Fruit oblate, conical. Skin greenish-yellow, with dull red blush. Quality good. Season, January and February. Has so far only fruited lightly. In 1903, 2½ pecks; 1904, 2 pecks; and 1905, a few specimens only. Said to be a good cropper when it gets well established.

Belle de Boskoop.—Tree planted in 1897. A strong grower. Fruited first this season, yielding 4 pecks. Fruit round, oblate, medium to large. Skin yellow, shaded and obscurely striped with red, russeted over nearly the whole surface. Season February and March.

Buckingham.—One tree set in 1895. A fairly strong grower. Fruited first in 1904, yielding 9 pecks; a few specimens only this year. The fruit is oblate, conical and of medium size. Skin greenish yellow, striped, shaded and splashed with crimson. Season, January. Quality excellent. This is a promising sort and apparently quite hardy.

Canada Baldwin.—Three trees were set in 1890. These made the most promising growth at the start of any trees in the orchard. The branches and trunks became sun-scalded and gradually the trees have died, until now one only remains. The trees were abundant bearers when healthy. The fruit is oblate, of medium size. Skin greenish yellow, striped and washed with dark red. Season, December and January. Quality good.

Cinnamon Pine.—Two trees were set in 1897. The fruit seems to be identical with 'Anisovka.' These trees are situated in the sheltered orchard and do not drop their fruit so badly as those do more exposed. These averaged 2 pecks per tree in 1904, and 10·75 pecks in 1905.

Crimean Bogdanoff.—One tree set in 1895. Made strong growth. Fruited 1903, 9 pecks; and in 1905, 5 pecks. The fruit is ovate, medium to small. Skin yellow, nearly covered with red, striped. Quality poor. Season, November.

Cross, No. 15 M.—Two trees were set in 1897. They fruited well this season, averaging 12 pecks each. Fruit conical, ribbed, medium. Skin yellow. Quality poor, of no special value.

Danvers.—Synonym, Danver's Winter Sweet. Two trees were set in 1897. The trees are strong upright growers. Fruit oblong, conical, of medium size. Skin greenish-yellow, with dull blush. Quality good, sweet. Season, February and March. Bore their first fruit in 1904, when the trees averaged 3·37 pecks. In 1905, 2½ pecks each.

Derby.—Two trees were set in 1890. Strong growers. They averaged 10 pecks in 1904, and 16 pecks in 1905. The fruit is oblate, of medium size. Skin yellow, sometimes slightly striped with red. Quality good. A good cooking and fair dessert variety. Season, January and February.

Domine.—One tree planted in 1895. Tree a fair grower. Fruited for the first time in 1904, yielding 4 pecks. Few specimens in 1905. Fruit oblate, of medium size. Skin greenish-yellow, partly covered with stripes of light red. Quality good. Season, February and March.

Duchess.—Synonyms, Oldenburg, Duchess of Oldenburg, New Brunswicker. A well known and popular variety that needs no comment. Two trees set in 1893 averaged 7 pecks in 1903, 11 pecks 1904 and 17¾ pecks in 1905.

Enormous.—One tree was set in 1897. Made strong growth. Fruited first crop of quantity this season, yielding 10 pecks. Fruit very large, round. Skin yellow; quality fair. A Russian variety. It is fit for cooking by the middle of August, when it can be picked with profit. The fruit is ripe early in September and drops easily. Valuable as a very early cooking sort.

Fameuse.—Synonym, Snow, Snow Apple. Four trees were set in 1890. These have made strong growth. They bore their first crop of any quantity in 1903, averaging 6½ pecks. In 1904 they averaged 11·62 pecks, and in 1905, 9·25 pecks. The fruit is oblate, medium. Skin greenish yellow, nearly covered with red and crimson. Quality the very best. Season, November and December. One of the best dessert apples grown. Tree, hardy; fruit very liable to attack of apple scab, which may be kept in check by spraying with Bordeaux mixture.

Fanny.—Two trees were set in 1897. These have made fair growth. Fruited last season for the first time. Average yield of tree, 1904, ¾ galls.; 1905, 2·88 pecks. Fruit medium to large, round, oblate, conical. Skin dark red and crimson. Quality fair. Season, December and January. A promising variety.

Gano.—Two trees were planted in 1897 and two in 1898. These have made very strong growth. One of those set in 1897, when carrying about 6 pecks of fruit was struck by a strong wind and broken so badly that it was removed. The other tree yielded 5 pecks in 1903, 13¼ pecks in 1904, and 29 pecks in 1905. The fruit is round, conical, medium to large. Skin greenish yellow, covered with dark red. The two trees set in 1898 averaged 3 pecks in 1904 and 2½ pecks in 1905. The fruit of these two trees is roundish, oblate and not so evenly coloured as the above, being somewhat more striped. The first set trees more closely resemble the Black Ben Davis, and the latter are more like Gano. The fruit is similar in quality and very closely resembles the well known Ben Davis. These two varieties, however, mature here much better than the Ben Davis.

Grandmother.—Two trees were set in 1897. The trees are upright and vigorous growers. Fruit oblate, conical, medium to large. Skin greenish white, streaked and splashed with light red. Quality good. Season, September; of Russian origin. Fruited

in 1905, averaging 4½ pecks. Two trees set at the same time called *Avenarius* are the same as Grandmother. A fairly good dessert variety.

Grimes.—Synonym, Grimes' Golden. This is a good growing hardy variety, coming into fruit early. The fruit, however, runs small here. The tree is a good producer and the apple an excellent dessert sort. Season, January and February. Skin, yellow. A winter dessert apple of good quality for home use or local market.

Haas.—Synonym, Fall Queen. These trees were set in 1890. One has been top grafted. A strong grower. Fruit oblate, conic, of medium size. Skin greenish yellow, nearly covered with light red and striped with darker red. Quality poor. Season December. Average yield 1903, 9¾ pecks; 1904, 10 pecks, and 1905, 22 pecks. Not a desirable variety.

Hibernal.—This is a very hardy, vigorous, Russian variety of spreading habit, and one of the hardiest for extreme northern sections. Fruit oblate, conic, large. Skin greenish yellow, with dull bronze red on the sunny side. Valuable only for cooking, for which it is one of the best. Fruit hangs to the tree well and ripens evenly. Season, November and December. Tree planted in 1896 produced 3 pecks in 1903, 12 pecks in 1904, and 16½ pecks in 1905.

Hurlbut.—Synonym, Hurlburt. The two trees set in 1897 have made fair growth They bore a good crop in 1904, averaging 8½ pecks, and in 1905, 7 pecks. The fruit is medium to large, oblate, conical. Skin yellow, splashed and striped with red. Quality good. Season, January. This is a variety that should be more largely planted.

Jonathan.—Two trees were set in 1890. They have made fair growth. They fruited in 1903, averaging 3 pecks per tree. In 1904, 4 pecks, and in 1905, 9½ pecks. The fruit as grown here is small to medium, roundish, oblong, conical. Skin yellow, nearly covered with bright red and shaded into dark red in the sun. Quality good. Season, January to April. This variety, while of excellent quality, is sometimes too small to be profitable.

Keswick.—Synonym, Keswick Codling. Three trees set in 1890. One has been top grafted. They have made good growth. The two fruited, bearing an average of 21 pecks in 1903; 12 pecks in 1904; 34 pecks in 1905. Fruit round, oblong, conical, of medium size. Skin greenish yellow, sometimes slightly blushed in sun. Valuable only as a cooking apple. Season, October and November. Inclined to run small from setting too much fruit. Should be thinned. Not recommended.

Longfield.—Three trees were set in 1890. They have made strong growth and have fruited abundantly. The fruit is round, oblong, conic, small to medium. Skin yellowish white, with blush on sunny side. Quality good. A rather pleasant eating apple and good for cooking. Very hardy. Season, November and December. Useful for extreme northern sections.

McIntosh Red.—Three trees were set in 1890. They have made fair growth. Two trees set as 'Princess Louise' in 1892 have turned out to be McIntosh Red. They have made strong growth. The first trees planted yielded in 1903 an average of 7·67 pecks per tree; in 1904, 5·33 pecks, and in 1905, 25 pecks. The last set yielded an average of 2 pecks in 1904, and 12½ pecks in 1905. This variety has done well since 1903. The fruit has developed perfectly, and this apple may be regarded as one of the very best apples growing on the farm. This variety belongs to the Fameuse group, and is liable to scab if not carefully sprayed with Bordeaux; of fine quality for dessert. Season, December and January. Tree perfectly hardy, a good grower and productive. Fruit round, oblate, slightly irregular, medium to large. Skin whitish yellow, covered over nearly the whole surface with dark, rich wine red, shading to pinkish crimson in the shade. Should be more largely grown.

McMahan.—Synonym, McMahan White. One tree was planted in 1897. A very strong, vigorous grower. Fruit large, conical. Skin whitish-yellow. A good cooking sort. Season, December. One of the best growing trees for top grafting. An excellent sort for northern sections. Yielded in 1903, 5 pecks; 1904, 13½ pecks; in 1905 a few specimens only.

Melonen.—Synonym, Melon. One tree was planted in 1897. A strong grower. Fruited in 1904, 9¼ pecks, and in 1905, 18 pecks. Fruit oblate, of medium size. Skin yellow, somewhat striped with red. Season November. Quality poor. Of Russian origin. Fruit drops badly just before it is fully matured. Of little value.

Missouri.—Missouri Pippin. Two trees were set in 1897. Made strong growth. They averaged 5 pecks of apples in 1903, 5 pecks in 1904, and 6¾ pecks in 1905. Fruit round, oblate, medium to small. Skin greenish yellow, splashed and striped with light and dark red. This variety has so far not succeeded well here, it grows too small to be profitable.

Northern Spy.—One tree planted in 1892 has made strong growth. It fruited well this season, the first good crop, yielding 12 pecks. A well known strong growing variety. One of the best winter sorts.

Northwestern Greening.—Two trees were set in 1897. They made very strong growth at the start, but have not proved a success. One had to be taken out in 1903 and the other was removed this season. The trouble seems to be that the wood is not strong enough to support the branches, which break easily with the weight of fruit; or with ice or snow lodging on the branches after a sleet storm. These trees produced good crops in 1902-03 and 1904. The fruit is large, round, conical, and of even size. Skin greenish yellow. Quality fair. Season said to be January and February; with us this fruit goes bad at the core after the last of January, or in some cases even earlier. Two other trees of this sort have been planted to give it a further test.

Ontario.—One tree was set in 1890 and one in 1897. These have made fair growth. The trees came into fruiting early. The first ones planted bore a good crop, 11½ pecks in 1903, in 1904, ¾ peck, and in 1905, 21 pecks. The last tree planted fruited, bearing 4½ pecks in 1903, a few only in 1904, and 7 pecks in 1905. This tree has been sunscalded during the past winter. It is useful principally for cooking. The fruit is oblate, conic, large. Skin whitish-yellow, red and striped. Season, January and February.

Ostrakoff.—Two trees of this variety were set in 1890. They have made strong growth. The average yield of these trees was 5 pecks in 1903, 21¼ pecks in 1904, and 12¼ pecks in 1905. The fruit is not of high quality and drops badly just before thoroughly matured. This sort is the same as the varieties planted as *Sultan* and *White Astrachan,* which have the same fault. Neither of these sorts are valuable. The fruit is oblong, conical, of medium size. Skin yellow, somewhat streaked with red. Season, September.

Patten.—Synonym, Patten's Greening, Patten's Duchess. Two trees were set in 1897. These have made strong growth. A seedling of Duchess. They come into fruit early. Average yield in 1903, 3¾ pecks; 1904, 9·37 pecks, and 1905, 8¼ pecks. Fruit large, of even size, roundish, oblate. Skin yellowish-green, with a bronze blush in the sun. A good cooking variety. Season, December and January. A good sort for northern sections. Tree very hardy.

Peter.—This variety, as grown here, so closely resembles the Wealthy apple that we consider it the same.

Pewaukee.—Three trees were set in 1890, 2 in 1891 and 2 in 1892. These have all made very strong growth, this variety being one of our best growing trees. A well known winter apple of fair quality, but of a greenish colour, which is against it for

market purposes. It is useful principally for cooking. Season, December. The fruit has the bad fault of dropping easily just before fully matured. Two trees in the orchard, protected with shelter of natural spruce, yielded in 1903 an average of 3½ pecks of dropped fruit, and 6 pecks were picked. Three trees in the unprotected orchard yielded in 1903 an average of 10 pecks of dropped fruit and 8 pecks picked. In 1905 the two trees in the protected orchard averaged 26¾ pecks picked and 1¾ pecks dropped, and in the unprotected orchard 3 trees averaged 13 pecks picked, and 2·33 pecks dropped. The season of 1904 was exceptional for winds.

Pointed Pipka.—Four trees were set in 1896. These have made very strong growth. The fruit is medium to large, oblong, conical. Skin whitish-yellow, streaked and splashed with bright red. Flesh white, good. Season last of September. A fairly good dessert apple of Russian origin. Same as the variety called Basil the Great. Tree very hardy.

Red Canada.—Synonym, Canada Red. Two trees were set in 1890. One cankered badly, made poor growth and was removed. The other has made good growth. It fruited in 1903, bearing 7½ pecks; 1904, 2¼ pecks, and in 1905, 14 pecks. The fruit is oblate, conical, of medium size. Skin greenish-yellow, covered nearly with red and striped with crimson. Quality good. Season, February and March. This is a good winter sort, and the tree is very hardy.

Russian Tyrol.—One tree was set in 1895, has made strong growth. This is identical with Longfield, already described.

Scott's Winter.—Two trees were set in 1890. They have made strong growth and came into bearing early. They averaged 13 pecks in 1903; 5½ pecks in 1904, and 6¼ pecks in 1905. The fruit is round, conical, small. Skin red striped. Quality fair. Season, February and March. The fruit of this variety is too small for general market purposes. Of value only for home use in northern sections, where other winter sorts will not succeed.

Serinkia.—Two trees were set in 1890. They have made good growth. Fruited in 1903 averaging 13½ pecks per tree. In 1904, 2·12 pecks, and in 1905, 25 pecks per tree. The fruit is of medium size, round, oblate. Skin pale yellow, somewhat striped with red. Quality fair. Season, October. A fairly good cooking and eating fruit.

Sunbeam.—One tree was set in 1897. This is a vigorous grower, and productive. It yielded in 1904, 25 pecks, and in 1905, 25½ pecks. The fruit is of medium size, roundish, conical. Skin whitish green with a blush in the sun. The fruit drops badly just before fully matured. Quality fair. Season, November and December.

Thaler.—Synonym, Charlotten-Thaler. This seems to be identical with Yellow Transparent, with the exception that it may be a few days earlier.

Titovka.—Synonym, Titus apple. Two trees were set in 1890. They have made strong growth. Fruited in 1904, bearing 17½ pecks per tree, in 1905 a few specimens only. The fruit is large, oblate, oblong. Skin greenish-yellow, often nearly covered with deep red, striped with dark red. Quality fair. Season, September. This is a good cooking apple. The variety, Little Hat, resembles this and is probably the same.

Wellington.—Two trees were set in 1893. They have made strong growth. They averaged per tree in 1903, 18 pecks; 1904, 8 pecks, and 1905, 24½ pecks. The fruit is of medium size, round, oblate. Skin yellow with blush on sunny side. Very acid. Quality good. Season, February to April. Valuable only for cooking. Liked on the English market on account of its pleasant acidity. A valuable commercial sort. Inclined to overbear, and run small. Should be thinned.

Williams.—Synonym, Williams' Favourite, Williams' Early. Two trees were set in 1897. These have made good growth. They fruited in 1903, averaging 1 peck per tree; 1904, 3¼ pecks, and 1905, 8¼ pecks per tree. The fruit is medium to large, round,

oblong, conic. Skin light red ground, but nearly covered with a dark red, striped somewhat. Quality good. Season, September. An excellent dessert market sort, and very attractive on account of its fine colour.

York Imperial.—One tree was set in 1897. It has made fair growth and fruited first in 1902. Fruited in 1904, 2¼ pecks; 1905, 12 pecks. The fruit is medium, oblate, oblique. Skin yellow, shaded with crimson, and indistinctly striped with red. Quality fair. Season, February to April. Somewhat inclined to be undersized.

Yellow Transparent.—A well known early variety. A valuable cooking apple, useful only for local markets and home use. A good eating apple when fully ripe. Five trees set in 1890 have made fair growth. They have fruited well. The average yield from these trees is as follows:—1903, 2¼ pecks; 1904, 5·6 pecks; and 1905, 13·7 pecks. These set their first fruit in 1893. Trees hardy. Season, last of August.

SOIL MOISTURE EXPERIMENTS.

Experiments to determine the moisture contents of soils when cultivated, as compared with those cropped were again conducted this season. The experiment included six different plots, each 25 feet wide and 400 feet long. Samples of the soil from these plots were taken at intervals of two weeks during the season to a depth of 14 inches by using round galvanized iron canisters which were driven into the ground to that depth and the column of soil removed. These samples were sent to Ottawa, where they were examined in the chemical laboratory of the Experimental Farms, and their moisture contents determined. The plots were alongside each other and the soil was of a fairly uniform character.

Plot No. 1.—The soil of this plot was in strawberries in 1903-04. The ground was ploughed early in the fall of 1904. It was thoroughly worked up on May 16 with the disc and springtooth harrows, and again once worked with the springtooth harrow before seeding to oats on May 23. The grain was sown with the seed drill at the rate of 3 bushels per acre. The growth of straw was good, averaging 36 inches. The crop suffered greatly for want of rain during the latter part of its growth and as a consequence the seed did not fill out well. The crop was harvested September 2. The ground had been seeded to timothy and clover with the oats. The grass and clover seed started fairly well, but owing to the dry weather at this date, October 30, there is not sufficient growth to cover the ground.

Plot No. 2.—The ground of this plot was in oats during 1904, having been seeded to clover and timothy with the oats in the spring of that year. The growth of clover this season was good, and the crop was cut for hay July 20, having made a growth of from 34 to 38 inches, averaging 2½ tons per acre.

Plot No. 3.—This plot was also in oats in 1904, having been seeded to timothy and clover in the spring of that year. The growth of clover was similar to that on plot No. 2, which it adjoined. This plot was cut with the mower when the crop was about 12 inches high on June 16, and the crop allowed to remain as a mulch. The clover was fairly thick. The plot was cut a second time July 8, when about the same growth had been made. The clover was again left as a mulch, which was fairly thick. The intention was to cut again in two or three weeks; but owing to extremely dry weather very little more growth was made during the season, and the crop was not again cut. The material left as a mulch soon dried out and was of very little use in conserving moisture.

Plot No. 4.—The ground of this plot was in strawberries in 1902-03 and '04. The ground was well worked up with the disc and springtooth harrows on May 16, 1905. It was again harrowed on May 23 with the springtooth harrow. On June 6 and 15 this ground was again harrowed, and on the latter date crimson clover at the rate of 30 pounds per acre was drilled in with the seeder. This made a quick start and soon covered the ground. The growth averaged about 13 inches by the middle of August. Very little growth was made after that date, the ground being practically dried out.

Plot No. 5.—The ground of this plot was previously treated as plot No. 4, it having been in strawberries and was ploughed early last fall. In 1905 this ground was cultivated in the same manner as plot No. 4, during the first part of the season, viz., until June 20, when it was thoroughly worked up with a land grubber to a depth of 5 inches. The soil was again worked with the springtooth harrow on July 4 and 20, and at the latter date crimson clover at the rate of 25 lbs. per acre was sown broadcast and harrowed in with the springtooth harrow. The clover started rather slowly, but has made a thick growth of about six inches, which thoroughly covers the ground at this date, October 30.

Plot No. 6.—The ground on this plot was treated as plot No. 5 in every respect, except that no cover crop was sown, and the land was left without any cultivation whatever after July 20. A few weeds started up on this ground, otherwise no plants were growing on it.

The moisture contents of these differently treated plots is given in the following table:—

PERCENTAGE OF MOISTURE IN PLOTS.

Date when Samples were taken.	Plot No. 1.	Plot No. 2.	Plot No. 3.	Plot No. 4.	Plot No. 5.	Plot No. 6.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
May 15	17·40	16·04	17·33	16·50	16·28	17·76
June 1	16·37	14·23	13·83	15·25	16·97	14·74
" 16	15·54	14·88	15·94	16·19	15·78	18·02
" 29	16·30	19·06	18·52	17.50	17·97	17·92
July 17	11·02	8·08	11·77	13·89	15·65	14·59
August 2	5·63	7·26	7·12	9·73	15·50	15·02
" 15	5·17	5·91	5·64	7·87	14·11	14·03
" 30	5·01	4·17	4·37	5·26	9·97	14·36
September 18	12·66	10·52	12·58	11·47	14·68	16·31
October 3	11·22	9·05	10·61	9·24	12·67	13·06
" 18	9·34	6·71	8·01	6·69	9·44	11·34

The object of this investigation was to learn to what extent the failure of fruit trees to grow properly in soils cropped with grains and grasses is due to a lack of moisture. It is a well known fact that trees growing in soil having an abundant supply of plant food may not in some seasons produce well or make satisfactory growth if grass or grain crops occupy the orchard soil at the same time. These latter crops are especially exhaustive of soil moisture, large quantities of which are used in their development, consequently the soil is, as these experiments show, rendered too dry for the proper development of trees which require the whole season for their growth.

Plot No. 4 was seeded to crimson clover to determine whether sufficient moisture would be conserved by cultivating only to the middle of June and then seeding to a cover crop in place of following the usual practice of cultivating to the middle of July and sowing a cover crop. It was also desired to ascertain if the crop of crimson clover

would shade the ground sufficiently to act as a mulch, and lessen evaporation from the soil surface, and in this way offset the loss by transpiration. It would appear in this connection, however, that the moisture taken from the ground by the plants was far greater than that conserved by them through the shade afforded by the foliage. The figures given show that this plot was too dry for proper plant development during the greater part of the season.

It will be seen that in plot No. 6 at no time during the season did the moisture fall below 10 per cent. It will also be noticed by referring to the above table that plot No. 5 only twice went below 10 per cent. This would seem to show that even in a season as dry as that of 1905, cover crops of crimson clover sown after the middle of July, on soil that has previously been properly cultivated to conserve moisture, will not dry out the ground to such an extent as to prevent a proper development of fruit and wood growth. It is apparent that the conditions prevailing in plots Nos. 1, 2 and 3, so far as moisture content is concerned, were not at all favourable for fruit tree development, and consequently the growing of grass or grain crops in the orchard is not advisable if best results are to be obtained.

The season has been exceptionally dry, especially since June. The following table gives the rainfall and the date on which the rain occurred from April 1 to November 1, 1905:—

RAINFALL, 1905.

April.		May.		June.		July.		August.		September.		October.	
Date.	In.	Date.	In.	Date.	In.	Date.	In.	Date.	In.	Date.	In.	Date.	In.
1	08	2	·76	2	·34½	2	·45	1	·06	4	1·33	9	·04
21	·40	4	·04	3	·05	3	·12	2	·10½	5	·15	11	·05
22	·62	7	·18	6	·65	15	·82	4	·12	6	·44	18	·26
25	·14	8	·40	8	·12½	26	·08	7	·62	13	·04	19	·19
.....		10	·74	12	·07	27	·03	23	·03½	14	·85	20	·19
.....		18	·50	13	·44	31	·06	30	·59	18	·04	21	·15
.....		20	·14	14	·12	.....	.....	.....	.....	19	·05	22	·33
.....		21	·11	17	·04	.....	.....	.....	.....	26	·48	.....	.....
.....		23	·05	18	·12	.....	.....	.....	.....	.....	.....	.....	.....
.....		30	·10	26	·11	.....	.....	.....	.....	.....	.....	.....	.....
.....		.....	.....	27	·92	.....	.....	.....	.....	.....	.....	.....	.....
.....		.....	.....	28	·31	.....	.....	.....	.....	.....	.....	.....	.....
Total..	1·24	..	3·02	..	3·30	..	1·56	..	1·53	..	3·38	..	1·29
Total Rainfall for the same period in 1904 and 1903.													
1904...	2·92	..	1·76	..	1·74	..	2·15	..	3·51	..	4·52	..	5·00
1903...	3·57	..	·68	..	2·29	..	2·07	..	2·40	..	3·63	..	5·78

EXPERIMENTS TO CONTROL THE PEA WORM.

Acting on the advice of Dr. Jas. Fletcher, Entomologist and Botanist of the Dominion Experimental Farms, Ottawa, some experiments were conducted this season to ascertain whether spraying pea vines and pods with a paris green mixture would prove a satisfactory remedy for the pea worm.

The strength of mixture used on the early plots was ¼ pound paris green to 40 gallons of water, to which one pound of whale oil soap was added so that the mixture would adhere to the plant better. One plot of the variety Heroine was treated later with a stronger solution of paris green and water, ½ pound paris green to 40 gallons of

water being used. The plots were once sprayed thoroughly just after the pods were formed, except the plot of Heroine, which in addition to being sprayed on July 20 with the ¼ pound paris green to 40 gallons of water, was again sprayed July 29 with ½ pound paris green to 40 gallons of water.

The results obtained would seem to indicate that spraying the plants with a paris green solution just as the pods are beginning to form is too early in the growth of the plant to get the best results.

It will also be seen that early varieties of pease are much less liable to injury from the pea worm that the later sorts, and pease which are fit to use from the first to the middle of August are the most injured by the pea worm.

The following results were obtained:—

Variety Treated.	Date when sprayed.	Date when pulled.	How Treated.	Number of pods shelled.	Per cent wormy.
Alaska	July 8	July 20	Paris green	500	4
			None	500	3
Gradus	" 15	" 25	Paris green	500	7
			None	500	8
American Wonder	" 20	Aug. 1	Paris green	500	11
			None	500	11
Heroine	" 20 and 29	" 17	Paris green	500	22
			None	500	27

STRAWBERRIES.

In addition to the small plots of strawberries set in the spring of 1904, several larger plots of some of the most promising varieties were planted. Each plot consisted of two rows set 3 feet apart, and one foot apart in the rows. The runners were allowed to spread and at the end of the season the two rows had made sufficient growth to cover the ground between the rows fairly well. The runners on the outside of these two rows were kept cut one foot from the rows. This made practically a matted row 5 feet wide of each plot.

The ground was a light sandy loam, which had not been manured since the spring of 1899, after which a crop of corn was taken off. The soil was well worked up and complete fertilizer and bone meal in equal parts at the rate of 800 lbs. per acre was used by sowing it broadcast and harrowing in before the plants were put out. The planting was done May 23.

The Warfield and Senator Dunlap have as usual given the best results. The Glen Mary and Clyde are two good sorts for local markets, but are too soft for shipping to any distance. The Lovett is rather small, otherwise is a good berry. The Beder Wood did not do as well as usual. The fruit was small and the plants not at all vigorous. The Howard No. 41 is not a desirable sort. The Warfield is inclined to run small towards the last pickings, and the plants are not very vigorous. The fruit stands shipment well, and as the plant is prolific and the fruit takes well in the market we consider it one of the best commercial varieties here. The Senator Dunlap is an excellent berry and may be recommended for commercial planting. The fruit is medium to large, conical, occasionally flattened slightly or ribbed; colour a dark rich crimson. Flesh firm and fine in texture, red throughout. Quality good, sprightly. Flowers perfect, having abundant pollen. The plants are strong, vigorous growers, probably the best berry we have yet tested here.

Three varieties of the Alpine, or perpetual strawberry have been tested during the past 4 years. They were St. Joseph, St. Antoine and Jeanne d'Arc. The quality of this fruit is excellent, but outside of that there is nothing to recommend them. The fruit is small. The plants are not everbearing; in fact, they have a shorter season with us than many of the commonly cultivated varieties. They are of no value from a commercial standpoint.

The size of these plots and the dates on which the fruit was picked, together with the yield per acre as calculated from the quantity produced on the plots, is given in the following table:—

STRAWBERRIES—TEST OF VARIETIES.

Variety.	Flowers.	Date when Picked.						Total Yield.	Size of Plot.	Yield per Acre.
		July 10.	July 13.	July 16.	July 20.	July 21.	July 28.			
		Qts.	Qts.	Qts.	Qts.	Qts.	Qts.	Qts.	Feet.	Qts.
Senator Dunlap	Per.	23	37	69	51	8	9	197	5 x 148½	11,557
Warfield	Imp.	22	29	82	18	24	4	179	5 x 148½	10,501
Glen Mary	Per.	.....	2	28	12	12	7	61	5 x 66	8,052
Lovett	Per.	9½	13	10	12	14	2	60½	5 x 66	7,986
Clyde	Per.	.....	7½	18	7	7½	.....	40	5 x 49½	7,040
Beder Wood	Per.	9	13	12	11	6	4	55	5 x 82½	5,808
Howard's No. 41	Imp.	4	7	13	5	.....	.....	29	5 x 49½	5,104

GARDEN PEASE.

Fifty-two varieties of garden pease were tested this year. The plots were on soil of a uniform character, and in a fair state of fertility. The seed was sown in rows 2½ feet apart, May 6, and the pease were planted about 2 inches deep and 2 inches apart in the rows. Each plot was 2 rows 16½ feet long. One row was allowed to ripen seed, and on the other row the pease were picked when fit for market, and the quantity of marketable green pods obtained. The following table gives the yield from these plots, together with other notes taken on the varieties.

The variety Early Excelsior is an exceptionally early and valuable dwarf pea. Thomas Laxton continues to give best results as a second early sort. The extra Early Leviathan about the same season as Thomas Laxton, is not as good, judging from one test. Carter's Early Morn is practically the same as Gradus. The variety Rivenhall Wonder is a fine medium late kind. Juno is the best late kind tested.

GARDEN PEASE—TEST OF VARIETIES.

Variety.	Length of Vine.	Length of Plot.	Number of Peas in Pod.	Date of Picking.		Total Yield from Plot.	
				July 24.	July 31.		
	Inches.	Inches.		Lbs. Oz.	Lbs. Oz.	Lbs.	Oz.
Alaska	36	2¼ to 2¾	5 to 7	5 2	.. 10	5	12
Station	36	2¼ " 2¾	5 " 7	6 10	.. 8	7	2
New Surprise	36	2¼ " 2¾	5 " 7	7 ..	.. 9	7	9
Gregory's Surprise	36	2¼ " 2¾	5 " 7	6 8	1 4	7	12
Early Excelsior	18	3¼ " 3¾	5 " 7	5 4	4 9	9	13
Burpee's Extra Early	34	2½ " 2¾	5 " 7	5 11	2 ..	7	11
Chelsea	20	3 " 3½	6 " 8	4 6	2 3	6	9
Electric Light	27	3 " 3½	5 " 8	4 ..	4 9	8	9
First and Best	39	2¼ " 2¾	5 " 7	3 3	2 13	6	..
				July 28.	Aug. 4.		
Gradus	40	3½ " 4¼	5 " 8	5 10	2 2	7	12
Prosperity	40	3½ " 4¼	5 " 8	6 8	1 2	7	10
Thomas Laxton	40	3 " 3½	5 " 8	6 3	5 5	11	8
Nott's Excelsior	18	2¾ " 3	5 " 8	3 2	3 12	6	14
A I	40	3 " 3½	5 " 7	5 4	5 2	10	6
Nott's Excelsior	20	3 " 3¼	5 " 8	4 ..	5 11	9	11
Philadelphia	36	2½ " 2¾	6 " 7	5 ..	2 ..	7	..
Claudit	42	3½ " 3¾	6 " 9	6 2	4 8	10	10
Early Morn	36	3¼ " 3¾	6 " 8	4 ..	1 4	5	4
William Hurst	18	3 " 3½	6 " 8	3 8	6 12	10	4
Premium Gem	22	2½ " 3	5 " 7	2 10	3 ..	5	10
Dwarf Wrinkled Sugar	22	2¾ " 3	5 " 7	3 6	2 12	6	2
				July 31.	Aug. 7.		
Prolific	37	2¾ " 3¼	6 " 8	4 5	5 8	9	13
Sutton's Excelsior	20	3 " 3½	5 " 7	5 4	1 ..	6	4
Sutton's Forcing	18	2½ " 3	3 " 7	3 ..	1 2	4	2
Melting Marrow	20	2¾ " 3¼	5 " 7	2 4	1 5	3	9
King of Dwarfs	22	2¾ " 3	5 " 7	6 4	1 ..	7	4
				Aug. 7.	Aug. 14.		
New Second Early	45	3¼ " 3½	8 " 10	6 ..	2 3	8	3
Rivenhall Wonder	20	3½ " 4	6 " 9	6 4	2 6	8	10
British Wonder	20	3¼ " 3¾	5 " 7	5 4	3 12	9	..
Admiral Dewey	55	4 " 4¼	6 " 8	11 4	1 8	12	12
Boston Unrivalled	55	3¾ " 4¼	6 " 8	10 8	3 2	13	10
Improved Senator	48	4 " 4¼	6 " 8	5 0	2 1	7	1
					Aug. 17.		
Horsford's Market	30	3 " 3¼	5 " 7	3 4	8 11	11	15
McLean's Advancer	30	2¾ " 3¼	5 " 7	3 4	8 2	11	6
Prodigious	55	4 " 4¼	7 " 9	9 12	2 10	12	6
Prince Edward	42	3¾ " 4¼	6 " 9	9 12	2 3	11	15
Duke of Albany	42	3¾ " 4¼	6 " 8	4 10	4 13	9	7
Dwarf Champion	22	3½ " 3¾	6 " 8	2 6	2 14	5	4
American Champion	57	3¼ " 3¾	6 " 8	2 8	6 14	9	6
Dwarf Telephone	20	3¼ " 3¾	6 " 8	2 3	3 9	5	12
				Aug. 12.	Aug. 17.		
Champion of England	57	2¾ " 3½	6 " 8	4 ..	4 8	8	8
Duke of York	56	3½ " 3¾	6 " 8	4 6	5 .	9	6
Abundance	30	3 " 3¼	6 " 8	2 ..	4 8	6	8
Yorkshire Hero	34	3 " 3½	5 " 7	2 ..	4 1	6	1
Stanley	41	3¾ " 4½	6 " 7	3 4	4 7	7	11
Hurst's Reliance	46	3 " 3½	7 " 8	4 8	2 6	6	14
Perfection	47	3 " 4	6 " 9	3 ..	6 ..	9	..
Magnum Bonum	34	4 " 4½	6 " 8	3 8	8 2	11	10
				Aug. 14.	Aug. 21.		
Daisy	24	3¾ " 4½	7 " 9	3 4	3 5	6	9
Juno	24	3½ " 4	7 " 9	6 ..	5 9	11	9
Telephone	50	3½ " 4½	6 " 8	5 3	5 5	10	8
Fillbasket	24	3¾ " 4¼	7 " 9	5 ..	5 ..	10	..

GARDEN PEASE—SINGLE VS. DOUBLE ROWS.

Eight varieties of garden pease were sown in plots 33 feet long, each plot occupying an area 2½ feet wide. In one set of plots one row was planted down the centre of the plot, and in the other series 2 rows 6 inches apart were planted down the centre of the plot. The object of the experiment was to determine the gain, if any, of planting 2 rows of garden pease together instead of only one. The double rowed plots require much greater labour in hoeing, whereas in the single rows very little hand hoeing is necessary, the work being done with a horse and cultivator.

The yield was greater in the double rowed plots, and the general appearance of the plots for market decreased in value in proportion to the thickness of the vine growth on the double rowed plots. In the remarks on the general appearance of the pods when gathered, 10 points is taken as a standard of perfection. It will be seen that the dwarf kinds, Nott's Excelsior and American Wonder, were much more perfect in the double row plots than the variety Heroine. This was due to the much greater vine growth of the latter, which prevented proper development of pods when the vines trailed on the ground.

The yield from these plots is given in the following table:—

SINGLE VS. DOUBLE ROWS OF GARDEN PEASE.

Variety.	Kind of Row.	When Picked.		Total Yield from Plot.	Taking 10 as point of Excellence.
		July 24.	July 29.		
		Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	
Surprise	Double	12 7	3 4	15 11	9½
"	Single	6 8	1 2	7 10	10
Station	Double	12 10	5 ..	17 10	9½
"	Single	8 14	1 4	10 2	10
		July 28.	Aug. 4.		
Prosperity	Double	13 6	2 12	16 2	8
"	Single	8 11	1 2	9 13	10
Gradus	Double	16 10	2 ..	18 10	8
"	Single	8 8	.. 10	9 2	10
Thomas Laxton	Double	17 10	1 ..	18 10	8½
"	Single	13 ..	.. 12	13 12	10
		July 31.	Aug. 7.		
Nott's Excelsior	Double	19 4	.....	19 4	10
"	Single	11 12	.....	11 12	10
American Wonder	Double	15 8	2 4	17 12	9½
"	Single	8 8	2 ..	10 8	10
		Aug. 7.	Aug. 17.		
Heroine	Double	12 ..	8 12	20 12	6½
"	Single	8 6	3 4	11 10	9

GARDEN PEASE—STAKED VS. NOT STAKED.

The object of this experiment was to determine the value of putting stakes 6 inches apart for the pea vines to cling to in place of letting them go on the ground. Stakes of alder bushes about 4 feet long with many of the branches left on were used. One series of these plots consisted of single rows 2½ feet apart, and the other series

consisted of two rows planted 6 inches apart and 2½ feet from the center between these two rows to the center between the next two rows. The plots were all treated in a similar manner. They were all cultivated alike, and were sown at the same time. The stakes were stuck when the plants were 6 inches high.

It will be seen from the results that the yield from the single rows staked was not very materially greater than those not staked. The double rows, however, gave a better crop than the single ones. It was also quite apparent that the pods from the staked plots were much superior to those from the unstaked plots. This was especially the case with the double rows. This was no doubt due to the fact that when the vines are trailing on the ground the pods do not have the conditions so favourable for their development as they do when supported, and a single row not staked has a much better chance for proper development than two rows occupying practically the same space.

From the information obtained, it would appear to be safe to conclude that in small gardens it is a decided advantage to stake even half tall varieties and that to plant two rows 6 inches apart and allow a 2-foot space to the next row is much preferable to a single row 2½ feet apart, and produces about double the crop. On the other hand, the same number of stakes required for a single row will stake a double row by setting the stakes between the two rows. There is more difficulty in hoeing when double rows are planted. In large areas for market the most economical method is to run single rows 2 feet apart, and they can be so cultivated that very little hand hoeing is necessary. In large commercial areas staking the vines would be impracticable.

The following yields were obtained from these plots, each of which was one row 33 feet long. The yield per acre is calculated from the quantity obtained from these plots, and the bushels per acre was computed by allowing 40 pounds to the bushel. The variety used was Thomas Laxton, which weighs, of green peas in pod, 40 lbs. per bushel:—

EXPERIMENTS WITH STAKED VS. NOT STAKED GARDEN PEASE.

Variety, Thomas Laxton and how treated.	Date when Picked.				Total Yield per Plot.		Yield per Acre.	Yield per Acre.	
	July 29.		Aug. 4.						
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Bush.	Lbs.
Staked, single row	14	12	4	4	19	..	10,032	250	32
Not staked, single row	16	6	2	4	18	10	9,834	245	34
Staked, double row	20	..	9	10	29	10	15,640	391	..
Not staked, double row	17	..	2	12	19	12	10,428	260	28

GARDEN BEANS.

Eight of the sorts which have given the best results in the past were sown this year in plots of one row, each 49½ feet long. The rows were 2½ feet apart. The ground on which these were grown was of a uniform character, and in a fair state of fertility. The seed was planted May 29. The following table gives the dates on which the marketable snap beans were picked, and the yield per plot and per acre:—

Variety.	Colour of Pod.	Date when Picked.				Yield per Plot.		Yield per Acre.
		Aug. 4.	Aug. 12.	Aug. 18.	Aug. 25.			
		Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs. Oz.	Lbs.	Oz.	Lbs.
Bountiful	Green	15 ..	10 10	6 ..	1 8	33	2	11,660
Market Wax	Golden	6 ..	7 8	11 4	6 ..	30	12	10,824
Lightning	Green	10 8	12 ..	5 ..	2 14	30	6	10,692
Davis Wax	Golden	13 4	5 8	7 12	2 8	29	..	10,208
Early Warwick	Green	14 8	5 12	5 4	2 .	27	8	9,680
Low's Champion	"	5 12	5 2	6 12	5 2	22	12	8,068
Extra Early Edible Podded	"	9 12	6 8	3 ..	.. 14	21	2	7,436
Longfellow	"	4 ..	3 3	4 12	5 4	17	3	6,050

The variety Bountiful is one of the best green pod market beans tested here. The Lightning is a splendid variety, and it is especially rust-resistant, being much more so than the Bountiful. The Davis Wax rusted badly this year, as did the Keeney's Rustless Wax. The early Giant Wax and Best of All both are fine sorts. The Market Wax again proved to be equal to any of the golden podded varieties. Valentine Wax is a very prolific round Golden Pod variety. Longfellow we would not recommend. Low's Champion is a good one.

TOMATOES.

Fifty varieties of tomatoes were under test this season. The plants were started in the hot-bed April 1; transplanted to strawberry boxes, one plant to a box, April 13. These were planted in the open ground May 12, in rows 4 feet apart, and the plants 4 feet apart in the rows. Eight plants of each variety were planted.

The soil on which these were grown was used last year for cabbage, and was in a fair state of fertility. It was a light loam, rather deficient in humus. Bone meal and complete fertilizer mixed in equal parts was sown at the rate of 500 lbs. per acre broadcast, and harrowed in before the plants were put out.

The variety Spark's Earliana still continues to be the best sort for these provinces. Owing to a late spring and early fall frosts the season here for tomatoes is practically limited to 3 months—from June 15 to September 15—hence only the earliest ripening tomatoes are suitable for profitable planting. Spark's Earliana is the best smooth early variety yet tried. It has good size, and although the fruit is not as regular and smooth as it was when first introduced, yet it is better here in this respect than any of the other early kinds tried.

A very satisfactory method to follow in order to keep good, smooth stock of any variety is to select seed from the plants that produce regular smooth, early ripening fruit. Some of the most successful growers obtain the bulk of their seed by following this method.

The variety Tenderloin and Livingston's Globe are two sorts tested this season for the first time. Neither of these, judging from one season's test, are of any value for the maritime provinces. The former is a rough, late sort, and the latter large and smooth, but very late, and quite subject to rot. The variety Dominion Day, about a week later than Earliana but very prolific, has with us grown very rough fruit. The Chalk's Early Jewel has been under test for 3 years. It is a good, smooth tomato, fully 8 days later than Earliana, and much more liable to rot. We have found that

seed of Earliana does not germinate as easily as most other sorts, hence more care is necessary in starting this variety.

Experiments were conducted with Spark's Earliana to ascertain to what extent pinching off the top of the plant when about 5 inches high would increase the production of early fruit. By so doing side branches are started and instead of having a plant with only one stalk, 4 or 5 stalks are obtained, and instead of having only one flower cluster, several branches are had with flower clusters just as far advanced. This is a question of special importance in these provinces where at best the ripening of the fruit is very difficult.

Thirty-four plants of Earliana were pinched off May 10, and thirty-four others were left to grow up as a single stalk. These were started from seed sown April 1, and planted in strawberry boxes, one plant to a box, April 18.

The plants were put in the open ground June 12, by simply cutting the boxes and setting the plants without disturbing the earth at the roots. The vines were grown without stakes. The soil was a light loam. Complete fertilizer and bone meal mixed half and half was used by spreading broadcast around the places where the plants were to occupy, and digging it in well before planting. This was used at the rate of 1,000 lbs. per acre. The plants were set in rows 4 feet apart and 4 feet apart in the rows. Each plot was 1/82.5 of an acre, or two rows 66 feet long and 4 feet wide. The crop obtained from this area is given in the following table. The yield per acre is calculated from the quantity obtained from these plots:—

Variety Earliana.	Ripe Fruit Picked.						Green fruit picked Sept. 25th.	Total ripe fruit per plot.	Total yield of ripe fruit per acre.	Total yield of green fruit per acre.	Total yield per acre.
	Aug. 25th.	Aug. 30th.	Sept. 2nd.	Sept. 9th.	Sept. 15th.	Sept. 25th.					
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Bu. Lbs.	Bu. Lbs.	Bu. Lbs.
Pinched Back.....	6½	12¼	30¾	79¼	129	94¾	163¾	517¼	711 12	225 9	936 21
Not Pinched Back.	1	6	20¼	47¾	97½	101¾	226	518¼	712 35	310 45	1,023 20

ONIONS.

Five of the leading sorts of onions were tested this season. The ground on which they were grown was a light clay loam in a fairly good state of fertility, having been in onions the previous year. The ground was well worked up with the land grubber to a depth of six inches. Wood ashes at the rate of 1,000 lbs. per acre and complete fertilizer at the rate of 500 lbs. per acre were sown broadcast and harrowed in with the smoothing harrow. The plants were planted on the level ground in rows one foot apart and about 3 inches apart in the rows.

The seed was started in the hot-bed April 5, in boxes having about six inches of soil. The plants were transplanted from these boxes to the open ground May 25. Seed is better sown the third week in March, so that the plants will be in good condition for transplanting about the middle of May. It requires from 7 to 8 weeks to develop good plants. This season being exceptionally dry the plants did not make as good growth as usual.

The crop was pulled October 4, and the yield per acre is calculated from the weight obtained from one row 66 feet long.

EXPERIMENTS WITH ONIONS.

Variety.	Yield per Plot.	Yield per Acre.	Remarks.
	Lbs.	Bush.	
Golden Globe	56	616	Matured good.
Australian Brown	50	550	" "
Australian Yellow Globe	65	715	" "
Prizetaker	70	770	Matured fair.
Large Red Wethersfield	70	770	" "

EARLY POTATOES.

Eight varieties of early potatoes were planted on a light loam. The ground was manured at the rate of 30 one-horse cart loads of stable manure per acre the previous fall. This was worked up in the spring and rows were made 2½ feet apart and about 4 inches deep with the double mouldboard plough. The seed was planted one foot apart in the rows and covered about 4 inches deep. The ground was later harrowed over once, and after being cultivated several times between the rows the plants, when six inches high, were hilled up by using the double mouldboard plough.

The object of this experiment was to determine which variety would produce the largest quantity of marketable tubers for the early market. The seed was planted May 18, and the first digging was on August 5, and the second on August 18. The Irish Cobbler again produced the largest quantity of marketable tubers. The Early Andes deserves special mention for its quality. The following table gives the yield per acre from these plots. Each plot was one row 66 feet long:—

EXPERIMENTS WITH EARLY POTATOES.

	Dug August 5.		Dug August 18.	
	Marketable.	Not Marketable.	Marketable.	Not Marketable.
	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.
Early Michigan	176 ..	53 54	303 36	38 30
Early Andes	144 40	38 30	248 36	22 ..
Bovee	110 ..	75 54	268 24	33 ..
Early Envoy	107 14	72 36	303 36	24 12
Pearces Ex. Early	144 40	70 24	299 12	38 30
Early Sunrise	137 30	78 6	248 36	26 24
Rochester Rose	136 24	72 36	253 ..	26 24
Irish Cobbler	209 ..	53 54	316 48	33 ..

LIST OF THE BEST VEGETABLES TO GROW.

From several years' experience in testing many of the different varieties of vegetables now advertised by seed merchants in Canada and the United States, the following may be recommended as equal to any of those so far tested here:—

Pease, Tall.—Extra early: Surprise. Early: Thomas Laxton. Medium: Admiral Dewey. Late: Telephone Dwarf. Extra early: Early Excelsior. Early: Nott's Excelsior. Medium: Rivenhall Wonder. Late: Juno.

Tomatoes.—Sparks' Earliana.

Beans.—Green Pod. Early: Bountiful and Lightning. Late: Refugee or 1000 to 1. Golden Pod: Market Wax and Valentine Wax.

Corn.—Extra early: Extra Early Beverly. Early: Extra Early Cory and Premo. Medium: Crosby's Early.

Cucumbers.—White Spine.

Squash.—Autumn: Boston Marrow and Golden Hubbard. Late: Hubbard.

Parsnips.—Hollow Crown and Improved Half Long.

Carrots.—Chantenay

Onions.—Prizetaker and Australian Brown.

Lettuce.—Curled: Black Seeded Simpson. Cabbage: Improved Salamander.

Cabbage.—Extra early: Paris Market. Early: Jersey Wakefield. Medium: Early Spring and Succession. Late: Late Flat Dutch. Red: Mammoth Rock Red.

Celery.—Paris Golden Yellow Self-blanching, Improved White Plume and Perfection Heartswell.

Cauliflower.—Early Erfurt.

Beets.—Extra early: Egyptian Turnip. Early: Eclipse.

Spinach.—Victoria.

Salsify.—Sandwich Island.

Radishes.—French Breakfast and Icicle. Winter: Scarlet China.

Parsley.—Double Curled.

Citron Melon.—Colorado Mammoth.

Water Melons.—Cole's Early.

Egg Plant.—New York Improved Purple.

Brussels Sprouts.—Improved Dwarf.

Kale.—Dwarf Green Curled.

Asparagus.—Conover's Colossal and Argenteuil.

Rhubarb.—Linnæus and Victoria.

Turnips.—Golden Ball and Selected Purple Top Swede.

I have the honour to be, sir,

Your obedient servant,

W. S. BLAIR,

Horticulturist.



General View of Experimental Farm, Brandon, Man.

EXPERIMENTAL FARM FOR MANITOBA

REPORT OF S. A. BEDFORD, SUPERINTENDENT.

BRANDON, MAN., November 30, 1905.

To DR. WM. SAUNDERS, C.M.G.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit, herewith, my eighteenth annual report with details of experiments undertaken and work accomplished on the Experimental Farm for the province of Manitoba.

The past winter was a very pleasant one, with abundance of sunshine and very little snow.

The month of March was unusually mild and free from storms of all kinds. Several wild plants were in bloom on the 31st. The first seeding of grain was done on the 31st of that month, about ten days earlier than the average. The soil at this date was in excellent condition for seeding.

April was unusually dry and favourable for seeding, and nearly all the wheat was sown under the very best of conditions by the close of the month.

The rainfall during May and June was excessive, and in the Red river valley much of the young grain was seriously injured, but on this farm and in Western Manitoba generally no damage ensued.

The month of July was unusually favourable for all kinds of farm produce, and growth was very rank, so much so on this farm that a very large proportion of the grain was badly lodged, and at one time it threatened to be an unusually late harvest, but towards the end of August the temperature increased and grain of all kinds matured very rapidly.

During harvest the weather was quite favourable, there was no killing frost until September 11, when the thermometer indicated 5 degrees of frost. The crops were then all saved, hence there was no injury from this cause.

The yield of all kinds of grain was above the average, and the province rejoices in one of the most abundant harvests in its history.

On the Experimental Farm nearly all kinds of grain, roots and fodder plants gave unusually large returns.

EXPERIMENTS WITH SPRING WHEAT.

Owing to the abundant rainfall during June and July, spring wheat on summer-fallow lodged badly, and at one time it was feared that serious injury would again result from rust, but fortunately conditions were more favourable during August, 1905, and very little injury resulted from this cause. For some reason nearly all the spring wheat grown in Western Canada this year is light in colour, and very little of it grades No. 1 hard. On this farm nearly all of the wheat grades No. 1 northern, and the kernels are plump and well matured.

A feature of this year's crop was the excellent quality of the straw of Preston wheat. This was quite evident both in the small plots as well as in the larger fields.

Both Red and White Fife were badly lodged, but Preston stood up fairly well, and no doubt this fact accounts largely for the better returns obtained from the latter variety.

In many parts of this province the injury from smut in wheat has been greater this year than usual, and much loss has resulted. On this Farm all seed grain is treated with either bluestone or formalin, and there has been no injury whatever from this cause. Where the wheat has been treated and smut appears it is evident, either that the proper proportion of the drug has not been used or the work has been done carelessly.

Thirty varieties of spring wheat were sown this season on April 10 and 12, side by side, on black loam fallowed, the plots being one-twentieth of an acre each.

WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs	
1	Preston	Aug. 25	136	54	Stiff.	3¾	Bearded.	5,480	52	..	60	Considerably.
2	Laurel	" 21	138	54	"	4	Bald	7,260	47	40	58½	Slightly.
3	White Fife	" 29	141	51	Fair.	3½	"	5,960	47	20	56½	Considerably.
4	Huron	" 25	136	54	"	4	Bearded.	6,480	47	..	60½	"
5	Advance	" 27	138	51	Stiff.	3½	"	5,600	46	40	60¾	Slightly.
6	Red Fife	" 29	141	49	Fair.	3½	Bald	3,680	45	20	60¼	Considerably.
7	Wellman's Fife	" 30	142	57	"	4	"	6,800	45	..	58½	"
8	Haynes' Blue Stem	" 30	141	54		4	"	6,120	44	40	61½	Slightly.
9	Power's Fife	" 28	139	52	Fair.	3½	"	6,760	44	..	60	"
10	Minnesota No. 163	" 30	141	53	"	4	"	6,980	43	40	59	"
11	Percy	" 26	137	53	Stiff.	4	"	6,100	43	20	57	Considerably.
12	Riga	" 23	134	47	Weak	3½	"	5,640	42	40	57	Slightly.
13	Bishop	" 18	129	48	Fair.	3½	"	5,480	42	..	55¼	"
14	Stanley	" 25	136	53	Stiff.	4	"	5,780	42	..	59	"
15	Pringle's Champlain	" 25	136	47	Weak	4	Bearded.	5,700	41	40	61	Considerably.
16	Dawn	" 25	136	53	"	3¾	Bald	6,100	41	40	57	"
17	Monarch	" 30	142	50	"	4	"	6,800	41	..	60½	Slightly.
18	Australian No. 9	" 28	140	50	"	4	"	7,340	41	..	60	Considerably.
19	Herisson Bearded	" 29	139	47	"	4	Bearded	5,340	41	..	58¼	Badly.
20	Downy Riga	" 17	128	47	"	3	Bald	4,900	40	..	56	Slightly.
21	McKendry's Fife	" 30	142	52	"	4	"	6,200	40	..	60	Badly.
22	Chester	" 25	136	54	"	4	"	6,560	39	..	58½	Slightly.
23	White Russian	" 29	141	48	"	4	"	7,360	39	..	55½	Considerably.
24	Hungarian White	" 27	138	52	"	4½	Bearded.	5,460	38	20	57	Badly.
25	Early Riga	" 19	130	52	"	3½	Bald	5,000	38	..	58	Slightly.
26	Colorado	" 27	137	52	Stiff.	3½	Bearded.	5,400	36	40	58	Considerably.
27	Weldon	" 28	140	48	Weak	4	Bald	6,440	36	..	57	Slightly.
28	Countess	" 25	137	53	"	3½	"	4,640	36	..	60½	"
29	Clyde	" 26	138	51	Fair.	4	"	5,640	34	20	55	"
30	Red Fern	" 26	136	50	"	3½	Bearded.	4,600	33	20	60	Considerably.

EXPERIMENTS WITH MACARONI WHEAT.

As rust was not as prevalent as usual this year Macaroni wheat gave only a slight increase in yield over the ordinary wheats. It is unsaleable for milling purposes in this country, and for that reason we do not recommend it for general cultivation.

The size of the plots for this test was one-twentieth of an acre, the soil a black loam, summer-fallowed. All were sown on April 12.

MACARONI WHEATS—TEST OF VARIETIES.

Name of Variety.	Date of ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs	
Yellow Gharnovka	Aug. 29	139	51	Weak	2½	Bearded	6,280	54	..	59½	None.
Roumanian	Sept. 4	145	54	"	3	"	5,780	50	.	62	"
Goose	" 5	146	54	"	3½	"	5,660	49	..	62	"
Mahmoudi	" 3	144	46	"	3	"	4,000	46	40	60	Slightly.

EXPERIMENTS WITH EMMER AND SPELT.

The plots used for this test were one-twentieth of an acre each. The soil a black loam summer-fallowed. All were sown on April 12.

EMMER AND SPELT—TEST OF VARIETIES.

Name of Variety.	Date of ripening.	No. of Days Maturing.	Length of Straw	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Lbs.	Lbs	
Common Emmer	Aug. 27	137	47	Weak	2½	Bearded	6,760	2,840	45	None.
Red Emmer	Sept. 4	145	54	"	4	"	6,300	2,500	41	"
Red Spelt	Aug. 29	139	51	Stiff	3½	Bald	3,600	3,500	31	"
White Spelt	Sept. 1	142	49	"	5	"	4,320	2,280	27	Badly.

A TEST OF FERTILIZERS FOR THE GROWING OF WHEAT.

The soil used for this test was a light loam cropped for many years without fertilizer of any kind. Judging from this year's test, such soils are benefited by the use of chemical fertilizers.

The size of the plots was one-fortieth of an acre each. All were sown on summer-fallowed land on May 5 and harvested on September 1. There was no smut and very little rust. The grain was very badly lodged on all the plots. The variety of wheat sown on these plots was Red Fife.

—	Length of Straw.	Length of Head.	Weight of Straw per Acre.	Yield per Acre.		Weight per Bushel.
	Inches.	Inches.	Lbs.	Bush.	Lbs.	Lbs.
100 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high	53	3½	8,800	46	..	59
200 lbs. per acre of nitrate of soda, half sprinkled when the grain was 2 in. high, balance when 6 in. high	53	3½	8,400	43	20	58½
No fertilizer used	53	3½	8,000	38	40	58½
Superphosphate, 400 lbs. per acre, spread just before sowing	53	3½	8,400	42	40	58½
Muriate of potash, 200 lbs. per acre, spread just before sowing	53	3½	8,400	46	46	59
A mixture of 200 lbs. superphosphate, 100 lbs. of nitrate of soda, 100 lbs. muriate of potash, per acre, half spread before sowing, half when 2 or 3 inches high	53	3½	9,200	55	21	59

Different Preparations for a Wheat Crop.

(All on Plots of 1-20th acre.)

Preparation.	Rusted.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.
				Lbs.	Bush. Lbs.
Wheat after peas	None	May 29	Aug. 23	5,140	52 40
" " roots	"	" 29	" 24	5,080	48 40
" " wheat	"	" 29	" 30	5,100	45 00
" " corn	"	" 29	" 28	4,540	44 20
" " flax	"	" 29	" 23	3,580	43 00
" on summer fallow	Badly	" 29	" 30	4,780	37 00
" sown with shoe drill		April 24	" 30	6,600	40 00
" " " disc drill		" 24	" 30	6,300	38 20
" sown 1½ inches deep		" 12	" 30	6,500	45 00
" " 3 "		" 12	" 30	6,080	42 00

Field Plots of Wheat.

Variety.	Character of Soil.	Size of Field	Sown.	Ripe.	Weight per bushel.	Yield per Acre.
					Lbs.	Bush. Lbs.
Preston	Clay loam	10 acres.	April 4	Aug. 21	63	48 12
"	"	6 "	" 4	" 21	63	36 20
Red Fife	"	8 "	" 12	" 30	62	40 45
"	"	11 "	" 12	" 30	62	36 45
Pringle's Champlain	"	5 "	" 7	" 20	63	38 48
Laurel	"	5 "	" 4	" 22	60	37 10

PREVENTIVES OF SMUT IN WHEAT.

As mentioned elsewhere there has been an unfortunate increase throughout the Canadian North-west in the amount of smut in wheat. Only 3 per cent of the 1904 crop was rejected for this cause by the inspectors at Winnipeg, but out of a total of 16,603 cars inspected up to November 1 of this year, 994 or 6 per cent have been rejected. This represents an immense loss to the farmers of this country, nearly all of which could have been avoided by the proper use of such smut preventives as bluestone and formalin.

From information gathered at farmers' meetings I judge that sufficient care is not exercised in the preparation and application of bluestone. Some farmers use cold water to dissolve the drug and do not give it sufficient time to make a complete solution, others fail to thoroughly stir the grain during the time the liquid is applied and a proportion is not moistened.

After formalin has been applied to the grain the heap should be well stirred, then covered with canvas or old bags so as to keep in the fumes.

From the accompanying table it will be noticed that both formalin and bluestone were effectual in preventing smut, whether applied by steeping or sprinkling and in addition the treated seed gave a larger yield in every instance. This agrees with our experience here in former years and I am strongly of the opinion that smut in wheat can always be prevented by the proper use of bluestone or of formalin.

The seed used for this test was very smutty Red Fife; the size of the plots was one-fortieth acre, the soil a sandy loam summer-fallowed. All were sown on April 25 and harvested on September 29.

How Treated.	Good heads in 9 sq. ft.	Smut heads in 9 sq. ft.	Yield per Acre.	
			Bush.	Lbs.
Smutty wheat sprinkled with 9 oz. of formalin to 10 galls. of water.....	428	00	38	00
Smutty wheat steeped 5 minutes in 4½ oz. of formalin to 10 galls. of water.	382	00	37	00
Smutty wheat sprinkled with 1 lb. of bluestone to 1 pail of water.....	506	00	35	20
Smutty wheat steeped 5 minutes in ½ lb. bluestone to 1 pail of water.. .	522	00	35	00
Smutty wheat not treated.....	430	61	33	20

A TEST OF SELECTED AND UNSELECTED SEED.

During the past year Dr. Charles Saunders, Cerealist of the Dominion Experimental Farms, made a careful selection of seed from a number of varieties of wheat, with the object of eliminating the yellow skinned kernels and bringing the sample up to a uniform grade and colour. A portion of the grain was sown here in one-twentieth acre plots and adjoining plots of the same size were sown with unselected grain of the same varieties. From the accompanying tables it will be noticed that the selected grain gave the best returns in every instance:—

	Bush.	Lbs.
Preston, selected by Dr. C. Saunders..	52	
" unselected, Brandon Experimental Farm..	50	20
Percy, selected..	43	20
" unselected..	35	20
Stanley, selected..	42	
" unselected..	37	20
Laurel, selected..	47	40
" unselected..	43	40
White Fife, selected..	47	20
" unselected..	38	20
Downy Riga, selected..	40	
Riga, selected..	42	40
Early Riga, unselected..	38	

NOTE.—Both the Riga and the Downy Riga were selections from the Early Riga.

ROTATION OF CROPS.

In the spring of 1899 arrangements were made for a series of rotation plots, the principal object being the maintenance of the fertility of the soil by the ploughing under of a leguminous crop every third year instead of the usual summer-fallow.

As the first field selected for this purpose was flooded in 1902 and 1904, it was considered unsuitable, and a new location was selected this year.

The Red Clover was sown at the rate of 12 pounds per acre and mixed clovers in the proportion of 8 pounds of Alfalfa and 6 pounds of Alsike per acre. These leguminous plants were ploughed under when they reached their fullest development.

The order of rotation is as follows:—

1905.	1906.	1907.
1. Pease	Wheat	Wheat.
2. Tares	Wheat	Oats.
3. Red Clover	Wheat	Wheat.
4. Alfalfa and Alsike	Wheat	Barley.
5. Wheat	Wheat	Pease.
6. Wheat	Oats	Tares.
7. Wheat	Wheat	Red Clover.
8. Wheat	Barley	Alfalfa and Alsike.
9. Wheat	Pease	Wheat.
10. Oats	Tares	Wheat.
11. Wheat	Red Clover	Wheat.
12. Barley	Alfalfa and Alsike	Wheat.
13. Wheat	Wheat	Summer-fallow.
14. Wheat	Oats	Summer-fallow.
15. Wheat	Barley	Summer-fallow.
16. Wheat	Wheat	Oats.
17. Wheat	Barley	Oats.

RESULTS OF FIRST YEAR, 1905, ROTATION TESTS.

Name of Variety.	Sown.	Ripe.	Days Maturing.	Length of Straw.	Yield per Acre.	Weight per bushel.
				Inches.	Bush. Lbs.	Lbs
Pease	May 6	Plowed under Aug. 6		48		
Tares	" 6	" " " 6		34		
Red Clover	" 26	" " Sept. 15		26		
Alfalfa and Alsike	" 26	" " " 15		41		
Wheat	" 6	Sept. 1	118	51	35 50	57
Wheat	" 6	" 1	118	51	36 20	57
Wheat	" 6	" 1	118	51	35 00	57
Wheat	" 6	" 1	118	51	33 00	57
Wheat	" 6	" 1	118	51	33 30	57
Oats	" 6	Aug. 29	115	55	105 00	34
Wheat	" 6	Sept. 1	118	52	35 20	58
Barley	" 16	Aug. 27	103	42	40 10	49
Wheat	" 6	Sept. 1	118	54	35 40	58
Wheat	" 6	" 1	118	54	35 10	58
Wheat	" 6	" 1	118	52	38 10	58
Wheat	" 6	" 1	118	50	35 10	58
Wheat	" 6	" 1	118	52	35 50	58

NOTE.—The varieties of grain used in this test were Red Fife wheat, Banner oats, Mensury barley and Pride pease. The size of the plots was one-tenth acre each.

EXPERIMENTS WITH OATS.

Forty-one varieties of oats were tested this year, the crop was a very heavy one. Although nearly every variety was badly lodged early in the season the kernels filled out well and the yield was the largest in the history of this farm. Numerous complaints are heard this year of loss from smut in oats. After several years' trial we have found that smut in this grain can be eradicated by the proper use of formalin.

Since this remedy has been used we have rarely seen a smutty head of oats on the farm.

The Daubeney oat was tried this year for the first time; it is extremely early and promises to prove very useful on land infested with wild oats; if cut on the very first appearance of the head very few wild oats will have matured, and the immature plants will make excellent fodder either green or cured.

The size of the plots in this test of varieties was one-twentieth acre each. The soil was a rich sandy loam, summer-fallowed. Two bushels of seed per acre was used. All were sown on April 27 and 28.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Golden Giant	Aug. 31	125	51	Fair	11	Sided	5,900	135	10	34	Consid'ably.
2	Improved American	" 27	122	55	Stiff	9	Branching	7,240	134	4	40	None.
3	Goldfinder	" 29	123	50	Weak	10	½ sided	5,300	132	12	33½	Slightly.
4	Golden Beauty	" 29	123	51	"	9	Branching	5,760	129	14	36	"
5	Golden Fleece	" 29	123	53	"	8	"	6,640	125	10	37	"
6	Banner	" 28	123	55	Stiff	9½	"	5,840	122	12	38	"
7	Bavarian	" 29	123	55	"	8½	"	5,820	121	26	36	Consid'ably.
8	Abundance	" 26	120	54	"	8	"	5,380	121	6	37½	"
9	Pioneer	" 23	117	54	"	9	"	5,600	120	20	40	None.
10	Siberian	" 29	124	54	Weak	10	"	5,660	118	28	36	"
11	Waverley	" 29	124	56	"	8	"	6,060	118	8	37½	Slightly.
12	Golden Tartarian	" 30	124	54	"	11	Sided	5,600	117	22	33	None.
13	Wide Awake	" 29	124	51	Fair	9	Branching	2,450	117	22	38	"
14	White Giant	" 26	120	53	"	10	"	2,720	117	2	35	Badly.
15	Mennonite	" 26	120	55	"	10	"	5,320	111	6	36	"
16	Tartar King	" 23	118	58	Stiff	9	Sided	5,180	115	10	41	None.
17	Black Beauty	" 23	117	50	Weak	12	Branching	3,920	114	4	36	"
18	Scotch Potato	" 29	123	56		9½	"	6,620	114	4	36	Slightly.
19	Holstein Prolific	" 27	121	56		9	"	4,420	114	4	36½	Consid'ably.
20	American Triumph	" 30	125	54	Weak	9	"	2,420	113	18	37	None.
21	Early Golden Prolific	" 28	122	54	"	9	"	5,060	112	32	37	Slightly.
22	Irish Victor	" 28	123	59	Fair	5	"	6,600	112	32	37	None.
23	Buckbee's Illinois	" 27	122	54	Stiff	9	"	6,500	111	26	38	"
24	American Beauty	" 26	120	54	Weak	10	"	5,380	110	..	35	Badly.
25	Lincoln	" 26	121	53	Fair	11	"	5,860	108	28	35	"
26	Kendal White	" 26	120	54	"	10	Sided	5,140	107	22	35	"
27	Joanette	" 27	121	43	Weak	9	Branching	3,960	107	2	35	"
28	Thousand Dollar	" 27	122	52	Fair	8	"	4,800	105	30	39	None.
29	Swedish Select	" 27	122	52	"	8	"	5,340	104	24	38	"
30	Daubeney	" 15	109	47	"	9	"	4,760	104	4	38	Slightly.
31	Danish Island	" 26	121	53	"	10	"	5,760	104	4	37	Consid'ably.
32	Columbus	" 26	120	53	"	9	"	2,390	103	18	35	Badly.
33	Green Russian	" 24	119	53	"	11	"	5,740	100	20	35	Slightly.
34	Sensation	" 28	123	57	"	9	"	5,140	98	28	38	None.
35	Improved Ligowo	" 26	121	56	"	9	"	6,180	97	22	36	Badly.
36	Olive Black	" 30	124	54	"	10	"	5,780	97	22	35	"
37	Storm King	" 26	120	53	Stiff	9	Sided	2,660	96	16	38½	Slightly.
38	Twentieth Century	" 39	124	54	Weak	9	Branching	5,660	95	10	38½	None.
39	Kendal Black	" 30	124	52	"	10	Sided	6,140	92	32	36	Badly.
40	Milford White	" 27	121	54	Fair	9	"	4,820	90	20	36	"
41	Milford Black	" 30	124	52	Weak	11	"	5,000	82	12	36	"

DIFFERENT methods of preparation for an Oat crop. All on plots of 1/20 acre each.

Preparation.	Sown.	Ripe.	Weight of Straw.	Yield per Acre.
			Lbs.	Bu. Lbs.
Oats on summer-fallow	April 29	Aug. 30	4,660	115 30
" after corn	" 29	" 23	6,880	106 16
" " roots	" 29	" 18	6,940	71 06

EXPERIMENTS WITH BARLEY.

Since wild oats have spread so much throughout this province, there is an active demand for an early variety of barley that will ripen before the wild oats shell, and by this means assist in eradicating the weed.

The Common six-rowed variety is one of the best for this purpose as it ripens earlier than any other kind grown by us, except the Champion, a beardless variety, unproductive and inferior in quality.

When barley is used for this purpose it should be cut before maturity, otherwise some of the wild oats will have shelled.

Thirty-four varieties of this grain were grown this year, nineteen of which were six-rowed and fifteen two-rowed. The yield was much above the average, but owing to the grain lodging early in the season, most of it was dark in colour.

Among the six-rowed kinds, the Mensury had the stiffest straw. Mansfield, the variety heading the list for yield, has always proved very productive here. It is a cross-bred variety produced on the Central Experimental Farm. This kind has given the highest average yield here for the past six years.

The size of the plots used for this test was one-twentieth of an acre. The soil was sandy loam, summer-fallowed. All were sown on May 17, in the proportion of two bushels of seed per acre.

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bush.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Mansfield	Aug. 19	94	39	Fair	3	5,180	77	24	51	Slightly.
2	Mensury	" 17	92	43	Stiff	3	5,880	75	20	49¼	Considerably.
3	Odessa	" 18	93	37	Weak	3	4,520	68	16	51	Slightly.
4	Argyle	" 20	95	37	"	3	5,880	67	04	49¼	"
5	Rennie's Improved	" 15	90	38	"	2⅝	4,300	66	32	50¼	"
6	Albert	" 17	92	38	"	3¾	4,120	66	12	50½	"
7	Oderbruch	" 16	91	35	"	2½	2,420	65	40	50	"
8	Summit	" 20	95	40	"	3	5,600	64	28	50	Considerably.
9	Stella	" 21	96	37	"	3	5,240	63	36	51	Badly.
10	Yale	" 18	93	43	"	3	4,240	63	36	50¼	Slightly.
11	Blue Long Head	" 23	98	35	Fair	3½	2,640	62	44	42½	Badly.
12	Brome	" 17	92	37	Weak	3½	4,680	62	04	52	Slightly.
13	Nugent	" 17	92	41	"	2½	4,700	60	20	49	"
14	Common	" 15	90	41	"	2½	3,920	60	..	49	"
15	Claude	" 16	91	35	"	2¼	4,900	58	16	49	"
16	Empire	" 19	94	36	"	3	5,020	55	40	51	Badly.
17	Trooper	" 20	95	32	"	2	5,440	53	16	49½	Considerably.
18	Royal	" 17	92	39	"	3	3,000	50	..	49	Slightly.
19	Champion	" 15	90	43	Fair	3½	5,340	42	44	44	"

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bush.	Rusted.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.	
1	Gordon	Aug. 22	97	44	Stiff	3	5,640	67	44	50¼	None.
2	Jarvis	" 22	97	44	"	4½	8,200	63	36	50	"
3	Harvey	" 19	94	46	"	4	6,260	63	16	50	Slightly.
4	French Chevalier	" 23	98	42	Weak	4	5,380	62	04	49½	"
5	Danish Chevalier	" 23	98	42	"	4	4,780	60	40	50	"
6	Standwell	" 22	97	44	"	3½	4,340	59	28	50	"
7	Canadian Thorpe	" 23	98	42	Fair	3	4,640	56	32	49	Badly.
8	Beaver	" 22	97	46	"	3⅕	4,680	54	28	48	Slightly.
9	Clifford.	" 23	98	48	Stiff	3⅕	6,000	54	08	50¼	None.
10	Dunham	" 22	97	49	Weak	3½	4,620	53	36	49	Slightly.
11	Swedish Chevalier	" 25	100	41	Fair	4	6,920	53	36	52	"
12	Invincible	" 22	97	47	Weak	3	4,920	53	36	49	"
13	Newton	" 23	98	44	"	4	3,700	53	16	50½	"
14	Logan	" 22	97	44	Fair	4	5,760	52	44	49⅕	"
15	Sidney	" 22	97	44	"	4	5,980	48	16	50½	Badly.

DIFFERENT METHODS OF PREPARATION FOR A BARLEY CROP.

Preparation.	Sown.	Ripe.	Weight of Straw per Acre.	Yield per Acre.	
			Lbs.	Bush.	Lbs.
Barley after roots	May 16	Aug. 18	4,380	71	12
Barley after corn	" 16	" 18	4,380	65	..
Barley on summer-fallow	" 16	" 19	4,500	58	16

EXPERIMENTS WITH PEASE.

Owing to the attacks of Cutworms, the yield of pease on the uniform plots was slightly below the average, but the quality and weight were excellent. As a rule the pea crops on this farm do not suffer from the attacks of Cutworms, but last fall the land set apart for pease was flooded and a considerable quantity of stubble and other rubbish collected on it. This evidently proved good winter protection for the young Cutworms, and they commenced their destructive work just as soon as the pease appeared above the ground.

For the first time a trial was made of sowing pease with the newly introduced double disc drill. The seed was distributed more evenly than with either the Shoe or Hoe drill, and it was possible to plant the seed four inches deep even in hard summer-fallow, with the result that germination was remarkably even and vigorous.

In addition to the uniform plots of pease several acres of field pease were grown. These larger fields were free from rubbish in the fall, and the crop was not in the least injured by Cutworms.

The small plots were cut with a scythe, but the pea harvester attached to a mower was used for cutting the larger fields. When the pease were ripe and the straw perfectly dry, the harvester worked very satisfactorily.

The bulk plots of pease were threshed with the regular grain separator, but many of the pease were cracked, and I would not recommend this plan when the grain is wanted for seed purposes.

Thirty varieties of pease were on trial this year. The soil was a clay loam summer-fallowed. The size of the plots was one-twentieth acre. All were sown on April 19 and 20, in the proportion of two bushels of seed per acre for the small kinds, and three bushels for the larger pease.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
				In.	In.		Bus.	Lbs.	Lbs.
1	Early Britain	Sept. 10	144	54	3	Large	51	40	62
2	Mackay	" 16	150	64	2½	Medium	45	40	62½
3	Prince	" 18	152	70	3	"	45	..	61½
4	White Wonder	" 10	143	56	2¼	Small	44	20	63
5	Gregory	" 17	151	64	3	Large	44	..	64½
6	Prussian Blue	" 6	139	67	2½	Medium	42	..	60½
7	Wisconsin Blue	" 11	144	63	3	"	41	40	64½
8	Chancellor	Aug. 30	132	52	2	Small	41	40	64
9	English Gray	Sept. 8	142	52	2½	Medium	41	20	61½
10	Golden Vine	" 9	142	55	2	Small	40	40	63
11	Arthur	" 12	145	54	2½	"	40	20	64
12	Pearl	" 19	153	54	.....	Medium	40	20	63
13	German White	" 10	143	64	2½	"	40	..	65
14	Mummy	" 11	144	54	2	Small	38	40	64½
15	Black Eye Marrowfat	" 9	143	52	4	Large	38	20	62½
16	Kent	" 18	152	82	3	"	38	..	61
17	White Marrowfat	" 7	141	52	4	"	38	..	63
18	Duke	" 20	153	74	3½	"	37	40	62½
19	Picton	" 6	139	65	2¼	Small	37	40	63
20	Agnes	" 14	148	74	3	Medium	37	..	62½
21	Paragon	" 12	146	56	2½	"	36	40	63½
22	Victoria	" 10	144	56	3	"	36	20	64½
23	Pride	" 17	150	64	2½	"	36	20	62½
24	Daniel O'Rourke	" 10	143	64	3	Small	35	40	63
25	Prince Albert	" 20	153	53	2½	"	33	20	63½
26	Carleton	" 19	152	58	2½	Medium	30	40	64
27	Archer	" 19	152	68	2½	"	31	20	64
28	Nelson	" 7	141	54	2	"	31	..	62½
29	Crown	" 6	139	54	2	Small	29	20	64
30	Macoun	" 8	142	67	3	Large	29	50	63½

DIFFERENT METHODS OF PREPARATION FOR A PEA CROP.

ALL ON PLOTS $\frac{1}{20}$ ACRE.

Preparation.	Sown.	Ripe.	Yield per Acre.	
			Bus.	Lbs.
Peas on summer-fallow	April 29	Sept. 3	44	40
" after flax	" 29	" 3	43	..
" " corn	" 29	" 3	42	20
" " roots	" 29	" 3	40	..

PEASE AND OATS MIXED.

Proportion of seed used.	——	Yield per Acre lbs.
Banner oats, 2 pecks Pride peas, 8 pecks per acre..	Sown April 27, Harvested Sept. 1.....	3,960
" " 3 " " " 8 " " " ..	" 1.....	3,820
" " 1 " " " 8 " " " ..	" 1.....	3,600

EXPERIMENTS WITH FLAX.

The abundant rainfall of the past season has been favourable for flax, and the yield of both grain and straw is above the average.

The soil selected for this test was a rich black loam, summer-fallowed. These plots were all one-fortieth acre each, and the seed was sown in the proportion of 40 lbs. per acre.

FLAX—TEST OF VARIETIES.

Varieties.	Date of Sowing.	Date of Ripening.	Length of Straw.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			Inches.	Lbs.	Bus.	Lbs.	Lbs.
Russian	May 21..	Sept. 1..	29	2,600	30	40	55
Improved Russian	" 21..	" 4..	39	3,440	30	..	55
St. Petersburg	" 21..	" 4..	34	4,680	29	36	55¼
Novarossick	" 21..	" 2..	29	2,440	29	16	55
La Plata	" 21..	" 9..	32	2,640	27	48	55
Common	" 21..	" 4..	35	3,720	27	8	55½
Bombay	" 21..	" 1..	39	3,440	25	40	54⅓
White Flowering	" 21..	" 9..	26	2,720	24	16	55½
Yellow Seeded	" 21..	Aug. 29..	31	3,520	20	40	54
Riga	" 21..	Sept. 1..	31	2,360	20	..	55

MIXED GRAIN CROPS.

Proportion of Seed used.	Sown.	Harvested.	Yield per Acre.
			Lbs.
Goose wheat ⅓, Banner oats ⅓, Mensury barley ⅓	April 27....	Sept. 1.....	3,540
" ⅓, " ⅓, Pride pease ⅓	" 27....	" 1.....	3,460
Mensury barley ⅓, Banner oats ⅓, Pride pease ⅓	" 27....	" 1.....	3,620

THE SALE OF SEED GRAIN TO FARMERS.

For many years past much of the surplus grain on this farm has been sold to settlers in Manitoba for seed purposes. Wishing to know how this grain compared with that usually grown by farmers, and whether the product from it was still being used for seed purposes, a circular containing the following questions was sent out to as many of the purchasers as possible:—

1. How did the grain compare with that usually sown by you?
2. Was it productive?
3. Have you disposed of any grain, produced from it for seed purposes?
4. Have you taken any prizes at the fairs with it?
5. Do you still use the product of this grain for seed purposes?
6. If so, is it still of good quality?
7. Have you any suggestions to make regarding the sale of seed grain by the Experimental Farm?
8. Remarks.

Eighty-two replies were received, of these 75 were favourable, and only 7 unfavourable, the following are extracts from a few of the replies received:—

The Red Fife wheat I purchased from your Farm in 1898 was practically pure, therefore better than my own, and it is still the best wheat around here. I can count eleven, at least, who have been supplied with seed from the product of this lot of wheat. Your institution is proving very useful in supplying seed grain.

WM. GUILD, Kemnay, Man.

I procured four bushels of splendid Red Fife wheat from you in 1899 and I consider it as good to-day as when I got it from you. I have supplied a number of others with seed, and took the first prize at the fall fair this year. I consider the Experimental Farm the best place to secure pure seed grain.

A. WEST, Plumas, Man.

I consider it of great value to the country that reliable seed can be purchased at the Experimental Farm.

D. W. MCCUAIG,
Pres. Grain Growers' Assoc., Portage la Prairie, Man.

I am much pleased with the seed grain I have purchased from the Experimental Farm, and I have gained many prizes both in the old country and America with grain grown from the seed you supplied me.

WM. STEVENS, Virden, Man.

The five bushels of Banner oats I purchased from the Experimental Farm in 1899 was superior to any I ever had, it was very productive. I have supplied seed from it to farmers living all along the Canadian Pacific Railway between Stockton and Winnipeg. I think it is the only way for farmers of Manitoba to get pure, reliable seed, and I am very grateful to you for your kindness in selling it to me.

J. CASLICK, Glenboro, Man.

I got four bushels of Banner oats. They proved to be the best oats I have ever grown. I have supplied seed to a number of my neighbours. I also got six bushels of Red Fife wheat. I am still growing the same wheat and find it all right.

JAS. MILNE, Oak Lake, Man.

The two bushels of Banner oats I purchased from your Farm in 1895 was a very much better yielding strain than any I ever had, they gave a return of 880 bushels from ten acres of summer-fallow. I have supplied seed from this lot to farmers all over this district for twenty miles or more.

I got five bushels of Red Fife from you in 1899, it yielded better than any of my own grain. I have disposed of a great deal for seed purposes to other farmers. I have taken both a first and second prize with it at our fair.

W. R. COLLIS, Shoal Lake, Man.

I obtained 5 bushels of Odessa barley from your farm in 1899, I find it much better than the common barley. I sell all I can spare for seed purposes, 500 bushels were sold for this purpose last year.

D. B. GUNN, Louis Bridge, Man.

I purchased four bushels of Red Fife wheat from your Experimental Farm in 1894 and I think it is the best wheat I ever had. I believe the Experimental Farm is the proper place to buy pure seed.

B. C. CRAIG, Newdale, Man.

In 1899 I purchased five bushels of Red Fife from the Experimental Farm, it has given the best yield and best sample of any wheat I ever had. I have supplied seed to neighbouring farms every year.

G. H. UNDERHILL, Rapid City, Man.

EXPERIMENTS WITH INDIAN CORN.

This crop was considerably above the average in weight, and the ears were in the late milk stage when cut.

In addition to the plots sown for experimental purposes, about ten acres were sown for ensilage and fodder purposes.

The seed was sown on May 19 in rows 30 inches apart. The crop was cut on September 4. The soil was a sandy loam, summer-fallowed. Twenty-two varieties were sown and the yield per acre has been calculated from the weight obtained from two rows, each 66 feet long.

CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	Height.	Leafiness.	When Tasselled.	Condition when Cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
			In.				Tons.	Lbs.	Tons.	Lbs.
1	Longfellow	Rank	100	Leafy	Aug. 15	Late milk.	29	80	29	80
2	Angel of Midnight	Fair	112	"	" 12	"	25	1,744	21	240
3	Compton's Early	"	108	Very leafy	" 10	"	25	160	17	320
4	Compton's Early (Canadian seed)	"	110	"	" 10	"	24	48	23	1,520
5	Eureka	V. rank	115	Fairly leafy.	" 18	Early milk	23	1,520	20	920
6	Superior Fodder	Fair	114	"	" 18	"	23	464	19	1,600
7	Pride of the North	Rank	112	Very leafy	" 25	"	23	200	17	1,640
8	Early Butter	"	116	"	" 10	Late milk.	22	1,408	15	1,944
9	North Dakota White	Fair	102	"	" 15	"	22	880	19	280
10	Northern Dent	Rank	118	Fairly leafy.	" 12	"	21	1,560	21	768
11	Salzer's All Gold	"	116	"	" 21	Early milk	21	240	21	504
12	Red Cob Ensilage	Fair	114	"	" 24	In tassel	19	1,600	16	736
13	Thoroughbred White Flint	Rank	106	Very leafy	" 18	Early milk	19	808	18	960
14	Selected Leaming	Fair	104	Few leaves	" 17	"	19	280	14	512
15	King Philip	"	106	Very leafy	" 11	Late milk.	18	960	18	960
16	Early Mastodon	Rank	120	Fairly leafy.	" 11	"	15	1,680	10	1,120
17	Giant Prolific Ensilage	"	118	Few leaves	" 27	In silk	15	1,680	13	400
18	White Cap Yellow Dent	Fair	109	"	" 10	Late milk.	13	1,720	16	1,000
19	Champion White Pearl.	Rank	115	Fairly leafy.	" 21	Early milk	13	1,720	9	1,800
20	Cloud's Early Yellow	Fair	111	Few leaves	" 18	Late milk.	13	1,720	9	1,008
21	Mammoth Cuban	Rank	114	"	" 11	"	11	1,760	9	480
22	Evergreen Sugar	Fair	102	Fairly leafy.	" 17	Early milk	11	1,760	9	1,800

INDIAN CORN SOWN AT DIFFERENT DISTANCES APART.

Name of Variety.	Distance apart.	Height.	Condition when cut.	Weight per Acre, cut green.	
	Inches.	Inches.		Tons.	Lbs.
Champion White Pearl	24	120	Early milk	21	1,560
" "	30	132	"	23	1,520
" "	36	130	"	23	200
" "	42	128	"	21	240
Longfellow	24	103	Late milk	24	840
"	30	103	"	23	992
"	36	104	"	23	1,520
"	42	109	"	26	120
Selected Leaming	24	110	Early milk	17	320
"	30	118	"	26	800
"	36	118	"	26	800
"	42	124	"	27	1,440

Average Yield at different distances apart.	Tons.	Lbs.
Average yield of green corn 24 inches apart	21	240
" " 30 "	24	1,104
" " 36 "	24	840
" " 42 "	24	1,933

EXPERIMENTS WITH FIELD ROOTS.

All kinds of field roots have given above the average yield and the quality is excellent.

As usual two sowings were made of each kind, two weeks intervening between each sowing. Previous to this year all escaped injury from spring frosts and the average gain for five years from early sowing was in the case of turnips, 6 tons 1,515 lbs.; mangels, 2 tons 1,164 lbs.; and carrots, 3 tons 1,090 lbs. per acre.

This year, for the first time, the young mangel seedlings were slightly injured from the two light frosts of June 9 and 21. This did not, however, materially injure the crop and the yields from the early sowings are much the largest.

I am pleased to notice an increased interest taken in the growing of root crops throughout the province. Providing the seeding is done early, large returns can be obtained in nearly all parts of the country with comparatively little labour.

EXPERIMENTS WITH TURNIPS.

Twenty varieties of turnips were grown on the uniform plots this year. The season was a favourable one and the returns large. For the first time in the history of the farm the leaves were attacked by a fungus growth similar to rust. This was first noticed early in July and in a few days the leaves had a very rusty appearance, but with warmer weather it disappeared without apparently injuring the roots.

The soil was a sandy loam fertilized in the fall of 1904 with ten loads per acre of well rotted barnyard manure. The previous crop was mangels.

As usual two sowings were made. In every instance the early sown plots gave the largest returns.

The first plots were sown on May 20, and the second on June 3. The roots from both were pulled on October 4. The estimate of yield has been made from the produce of two rows, each 66 feet long.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.	Yield per Acre. — 1st Plot.	Yield per Acre. — 2nd Plot.	Yield per Acre. — 2nd Plot.
		Tons. Lbs.	Bush. Lbs.	Tons. Lbs.	Bush. Lbs.
1	Bangholm Selected	33 792	1,113 12	29 80	968 ..
2	Sutton's Champion	30 1,248	1,020 48	17 584	576 24
3	Carter's Elephant	30 984	1,016 24	20 656	677 36
4	Imperial Swede	30 456	1,007 36	26 1,328	888 48
5	New Century	30 192	1,003 12	18 432	607 12
6	Hartley's Bronze	29 1,928	998 48	24 1,896	831 36
7	Good Luck	29 1,400	990 ..	24 48	800 48
8	Perfection Swede	29 872	981 12	19 1,864	664 24
9	Elephant's Master	29 344	972 24	22 1,672	761 12
10	Emperor Swede	29 80	968 ..	19 1,336	655 36
11	Hall's Westbury	27 1,440	924 ..	27 1,176	919 36
12	Halewood's Bronze Top	27 912	915 12	24 1,104	818 24
13	Mammoth Clyde	26 1,328	888 48	22 88	734 48
14	Drummond Purple Top	26 536	875 36	21 768	712 48
15	Magnum Bonum	26 8	866 48	21 1,032	717 12
16	Skirvings	25 1,744	862 24	22 1,672	761 12
17	Jumbo	25 688	844 48	19 808	646 48
18	East Lothian	25 160	836 ..	20 1,184	686 24
19	Selected Purple Top	24 48	800 48	21 504	708 24
20	Kangaroo	18 1,224	620 24	16 1,528	558 48

EXPERIMENTS WITH MANGELS.

We find that mangels are relished by nearly all kinds of farm animals, cattle, swine and even chickens eat them readily. Unlike turnips they do not injure the quality of milk and its products.

As mangel seed is large and somewhat slow to germinate, the soil should be mellow and moist and the seed sown from two to three inches deep.

The roots are susceptible to injury from fall frosts, for which reason the crop should be pulled before the weather becomes severe.

Seventeen varieties of mangels have been on trial at the Experimental Farm this year. The yield was above the average and all were saved without injury.

The soil used for this crop was a black loam fertilized in the fall of 1904 with ten loads per acre of well rotted stable manure. The previous crop was turnips. The first sowing was made on May 20 and the second on June 3. All were pulled on October 4.

The estimate of yield has been made from the product of two rows 66 feet long.

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Prize Mammoth Long Red	42	744	1,412	24	23	1,520	792	..
2	Ideal	39	144	1,302	24	22	88	734	48
3	Selected Mammoth Long Red	38	1,880	1,298	..	23	992	783	12
4	Mammoth Long Red	38	560	1,276	..	24	840	814	..
5	Yellow Intermediate	37	976	1,249	36	24	48	800	48
6	Prize Winner Yellow Globe	36	192	1,223	12	27	1,440	924	..
7	Lion Yellow Intermediate	35	224	1,170	24	27	384	906	24
8	Half Long Sugar Rosy	34	640	1,144	..	23	464	774	24
9	Gate Post	33	1,848	1,130	48	26	800	880	..
10	Triumph Yellow Globe	33	792	1,113	12	27	1,176	919	36
11	Giant Yellow Globe	33	..	1,100	..	14	512	475	12
12	Selected Yellow Globe	32	944	1,082	24	24	840	814	..
13	Mammoth Yellow Intermediate	31	40	1,034	..	24	312	805	12
14	Giant Yellow Intermediate	30	720	1,012	..	29	80	968	..
15	Half Long Sugar White	30	720	1,012	..	29	872	981	12
16	Leviathan Long Red	29	1,136	985	36	24	312	805	12
17	Giant Sugar	29	80	968	..	25	160	836	..

EXPERIMENTS WITH CARROTS.

More than an average yield of carrots was obtained this year. This root so much relished by horses has given largely increased returns here since we have practised deep ploughing. This appears to encourage a large development of root.

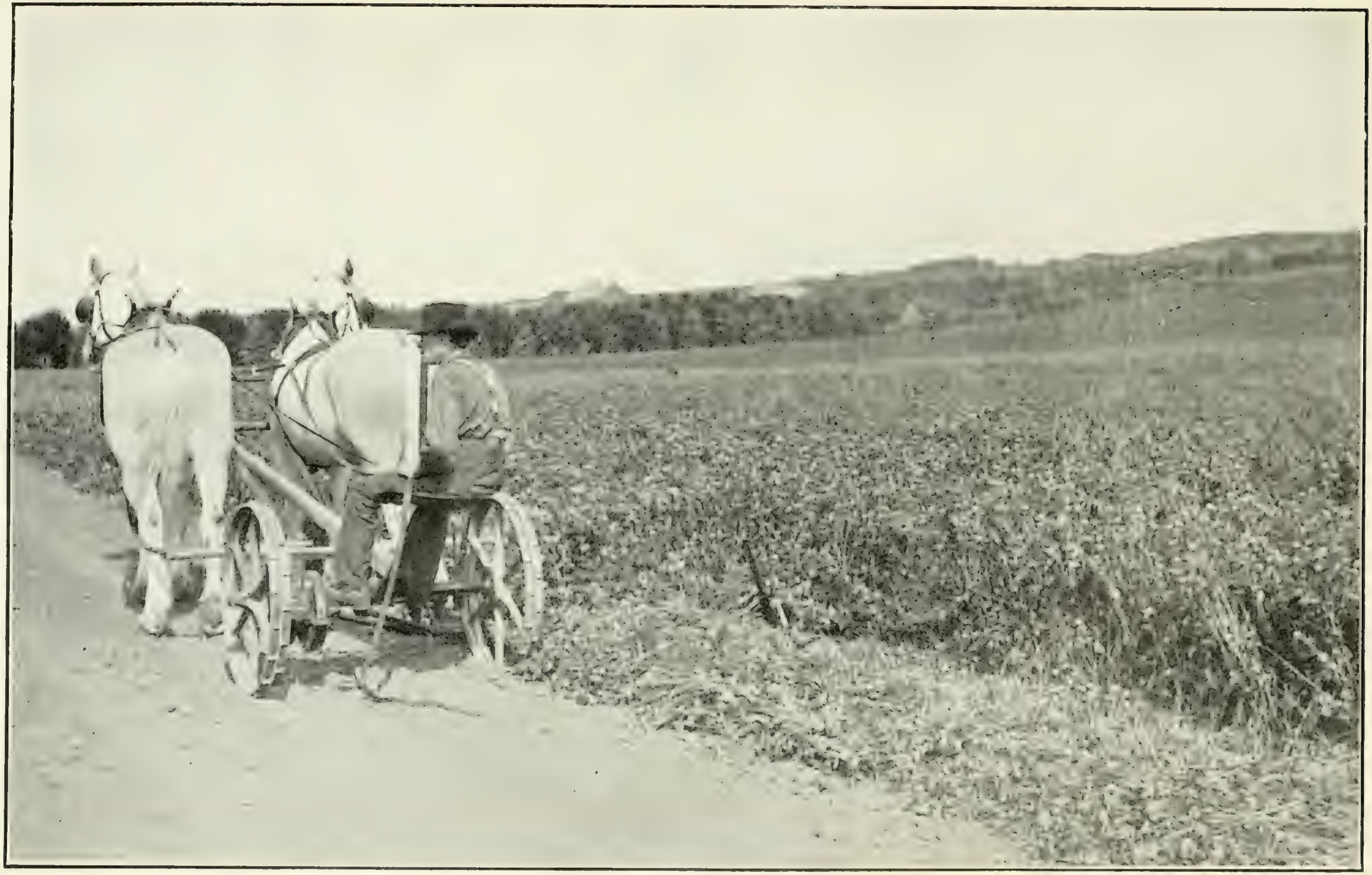
Eleven varieties were tested. The first sowing was made on May 20 and the second on June 3. All were harvested on October 4.

The soil was a black sandy loam, fertilized in the fall of 1904 with ten loads of well rotted manure per acre.

With one exception the early sown plots gave the largest yield. The yield has been calculated from the product of two rows each 66 feet long.

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Improved Short White	32	1,120	1,085	20	21	680	711	20
2	Giant White Vosges	31	1,360	1,056	..	22	1,320	755	20
3	Mammoth White Intermediate	27	1,880	931	20	17	320	572	..
4	New White Intermediate	27	120	902	..	23	1,960	799	20
5	Ontario Champion	26	1,240	887	20	21	1,120	718	40
6	Kos Kirches	26	360	872	40	17	1,200	586	40
7	Carter's Orange Giant	25	600	843	20	15	360	506	..
8	Early Gem	23	1,080	784	40	20	920	682	.
9	White Belgian	21	1,560	726	..	20	40	667	20
10	Long Yellow Stump Rooted	19	720	645	20	17	1,640	594	..
11	Half Long Chantenay	10	1,120	352	..	14	1,920	498	40



Common Red Clover, grown at the Experimental Farm, Brandon, Man.

EXPERIMENTS WITH SUGAR BEETS.

Eight varieties of these roots were tested this year, of these only three are recommended for use in the manufacture of sugar, viz., Vilmorin's Improved, Wanzleben and French Very Rich. All the varieties are, however, particularly useful as food for stock. We find young animals relish them better than either mangels or turnips.

The yield on this farm was very much above the average, but the three true sugar beets which were tested by Mr. F. T. Shutt, Chemist of the Dominion Experimental Farms, Ottawa, were not as rich in sugar as usual.

The first plots were sown on May 20 and the second on June 3. The early sown plots gave the largest returns in every instance. All were harvested on October 4.

The estimate of yield has been made from the product of two rows, each 66 feet long. The soil was a black sandy loam fertilized with ten loads of well rotted manure per acre. The previous crop was potatoes.

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Red Top Sugar	52	544	1,742	24	27	120	902	..
2	Danish Red Top	46	400	1,540	..	31	40	1,034	..
3	Royal Giant	33	528	1,108	48	25	952	849	12
4	Improved Imperial	33	..	1,100	..	23	1,520	792	..
5	Wanzleben	32	680	1,078	..	18	960	616	.
6	Danish Improved	28	1,024	950	24	26	800	880	..
7	Vilmorin's Improved	24	576	809	36	15	360	506	..
8	French Very Rich	21	240	704	..	16	1,000	550	..

EXPERIMENTS WITH POTATOES.

This useful vegetable has again given a large return. Some of the tubers were not so smooth as usual, but the quality was excellent.

The potatoes followed a crop of field roots; this plan gives an excellent yield with very little labour in weeding.

The soil received a light coat of well rotted barnyard manure in the fall, which was ploughed under and well rolled before winter set in.

Dreer's Standard, the variety heading the list this year, was third in productiveness on this farm in 1904. It is white in colour and of good quality, but it is rather late for this country. Canadian Beauty, the fifth on the list, is much earlier, nearly as productive and the colour is generally more acceptable to Canadian consumers.

As usual the very early kinds were not as productive as the later ones.

Forty-nine varieties were tested this year, there was no injury whatever from rot or from the attacks of the Colorado Beetle.

The soil selected was a sandy loam. All the varieties were planted on May 16 in rows three feet apart and dug on October 2. The yield has been estimated in each case from the product of one row 66 feet long.

Number.	Name of Variety.	Character of Growth.	When Matured.	Average Size.	Total yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
					Bu.	Lbs.	Bu.	Lbs.	Bu.	Lbs.	
1	Dreer's Standard....	V. rank.	Sept. 5.	V. large	887	20	858	..	29	20	White F. oval.
2	American Wonder...	"	" 3	"	799	20	729	40	69	40	" long.
3	Country Gentleman..	Fair....	Aug. 28.	"	788	20	711	20	77	..	Pink long.
4	Uncle Sam	Rank...	Not ripe..	"	762	40	689	20	73	20	White flat.
5	Canadian Beauty....	Fair....	Sept. 5.	M. to L.	759	00	682	00	77	00	Light pink, long.
6	State of Maine	V. rank.	Not ripe,.	V. large	755	20	718	40	36	40	Wh. flat, oval.
7	Sabeans Elephant...	"	Aug. 29.	"	744	20	696	40	47	40	White, long.
8	Morgan's Seedling...	"	Not ripe..	"	729	40	700	20	29	20	Pink, long.
9	Reeve's Rose.....	"	Sept. 2.	"	726	00	667	20	58	40	Light pink, oval.
10	Enormous	"	" 3.	Med....	722	20	630	40	91	40	White, round.
11	Moneymaker.	Fair....	" 1.	Large...	718	40	649	00	69	40	" kidney.
12	Empire State.....	Rank...	" 2.	Med....	704	00	638	00	66	00	" long.
13	Holborn Abundance.	V. rank.	Not ripe..	Large...	700	20	663	40	36	40	" round.
14	Rose No. 9.....	"	Sept. 11	" ..	696	40	649	00	47	40	Pink, long, flat.
15	Maule's Thorobred ..	Fair....	" 3.	" ..	689	20	630	40	58	40	" "
16	Delaware.....-	Rank'..	" 2.	" ..	689	20	630	40	58	40	White, long.
17	Pearce..... ...	Fair....	Aug. 28.	" ..	685	40	649	00	36	40	Pink, round.
18	Rose No. 9 White...	Rank...	Sept. 5.	Large...	685	40	667	20	18	20	Mixed, round.
19	Early St. George...	Fair....	Aug. 27.	Med....	678	20	586	40	91	40	Pink, long.
20	Dalmeney Hero.....	V. rank.	Not ripe..	Large...	671	00	638	00	33	00	White, oval.
21	Penn Manor...	Fair....	Aug. 27.	" .	663	40	597	40	66	00	D. pink, long, oval
22	Burnaby's Seedling..	"	" 24.	" ..	656	20	583	00	73	20	Pink, oval.
23	Swiss Snowflake.....	V. rank.	Not ripe..	Med ...	656	20	623	20	33	00	White, irregular.
24	Late Puritan.....	"	Sept. 1.	Large...	652	40	594	00	58	40	Wh. round, long.
25	American Giant.....	"	" 1.	M. to L.	638	00	579	20	58	40	Wh. oval.
26	Vermont Gold Coin..	"	Not ripe..	V. large	623	20	568	20	55	00	Wh. round.
27	Cambridge Russet...	Fair....	Sept. 1.	"	605	00	553	40	51	20	Russet, long.
28	Carman No. 3....	" ...	" 5	Med....	605	00	568	20	36	40	Wh. long.
29	Early White Prize..	Weak..	Aug. 23.	Large...	586	40	524	20	62	20	Lt. pink, oval.
30	Early Envoy.....	Fair....	" 25.	" ..	575	40	495	00	80	40	Pink, round.
31	Irish Cobbler.....	" ...	" 23.	M. to L.	575	40	562	20	73	20	Wh. flat.
32	Vick's Extra Early ..	Rank...	Sept. 1.	V. large	568	20	520	40	47	40	Wh. pink, flat.
33	Carman No. 1.....	" ...	" 11.	"	564	40	509	40	55	00	White, flat.
34	I. X. L....	" ..	" 1.	M. to L.	561	00	524	20	36	40	Pink, long.
35	Early Rose.....	Weak..	Aug. 22.	Med....	553	40	458	20	95	20	Pink, round.
36	Bovee	" ..	" 22.	Large...	542	40	476	40	66	00	" long.
37	Dalmeney Kidney...	V. rank.	Not ripe..	V. large	535	20	506	00	29	20	White, oval.
38	Everett	Weak..	Aug. 22.	Large...	531	40	462	00	69	40	Pink, long.
39	Seedling No. 7.	Rank...	Sept. 5	" ..	520	40	484	00	36	40	D., red.
40	British Queen.	" ...	Not ripe..	" ..	484	00	432	40	51	20	Wh., oval.
41	Early Elkinah.....	Fair....	Aug. 29	" ..	469	20	425	20	44	00	Pink, kidney.
42	Early Andes.....	" ...	" 22.	Med....	454	40	388	40	66	00	White, round.
43	Extra Early Eureka.	Rank...	Sept. 11.	" ...	432	40	377	40	55	00	Pink, kidney.
44	Dooley..	" ...	" 12.	V. large	403	20	374	00	29	20	White, round.
45	Rawdon Rose.....	Weak..	Aug. 22.	Large...	381	20	319	00	62	20	Light, pink, oval.
46	Pingree	" ..	" 21.	Med....	348	20	300	40	47	40	White, oval.
47	Admiral Dewey.....	" ..	" 28.	" ...	326	20	278	40	47	40	" long.
48	Rochester Rose.....	" ..	" 23.	" . .	308	00	216	20	91	40	Light, pink, long.
49	Naught Six.....	Fair....	Sept. 1.	Large...	291	00	227	20	69	40	White, round.

EXPERIMENTS WITH GRASSES.

Owing to abundant rains the yield of grasses and pasture has been good in all parts of this province. It was, however, somewhat difficult to cure owing to heavy growth and frequent showers. Where the crop is heavy the use of a hay tedder is a great advantage, by its use the hay can be cured quicker and much more uniformly.

While Timothy and Western Rye grass can be cured in the bunch or cock, Brome grass requires to be thoroughly cured before being cocked, otherwise it turns dark in colour and is very dusty.

Variety.	Sown.	Height.	Seed per Acre.	Yield of Hay per Acre.	
		Inch.	Lbs.	Tons.	Lbs.
Timothy	1902	44	9	2	200
"	1903	47	9	2	1,000
Bald Wheat grass *(Elymus Virginicus)*	1903	53	12	2	200
Western Rye grass *(A. tenerum)*	1902	48	11	2	100
Western Rye grass *(A. tenerum)*	1903	47	11	2	1,000
Austrian Brome *(Bromus inermis)*	1902	60	12	2	1,400
Austrian Brome *(Bromus inermis)*	1903	47	12	3	1,900
Red Top *(Agrostis vulgaris)*	1902	38	15	2	600
Hard Fescue *(Festuca duriuscula)*	1900	35	15	2	1,000

EXPERIMENTS WITH CLOVERS.

The fall of snow was light last winter, but all kinds of clover wintered well, both new and old fields giving fair returns.

From several years' observation I am of the opinion that most of the failures with clover can be traced either to the use of a nurse crop of grain the first year, where the grain is allowed to ripen, or to close pasturing in the autumn. We have found that clover invariably winter kills if pastured late in the fall, enough growth should be left to catch the snow, which is one of the very best protectors.

ONE ACRE PLOTS OF CLOVER.

The three plots of clover sown in 1904 produced a luxuriant crop which was a constant source of attraction to visiting farmers all summer. The seed was sown on June 1, 1904, on summer-fallowed land with half a bushel of barley per acre; this was cut while green and removed from the ground, the clover then grew rapidly and before winter all three kinds had fully occupied the ground. The accompanying tables give the yield per acre. The alsike clover was only cut once as the aftermath was light.

Varieties.	Height.	Condition When Cut.	Yield of Hay per Acre.		Total Yield per Acre.	
	Inch.		Tons.	Lbs.	Tons.	Lbs.
Common Red, first cutting	43	Full bloom	2	395	.....	
" second cutting	12	"	1	468	3	863
Alfalfa, first cutting	50	$\frac{1}{10}$ in bloom	1	1,348	.....	
" second cutting	24	$\frac{1}{10}$ "	1	552	2	1,900
Alsike	37	Full bloom	2	518	2	518

The following table gives the yield and other particulars regarding the one-twentieth acre plots of clover, all were sown in spring on ploughed stubble without a nurse crop and the weeds and volunteer crop of grain was kept cut during the first

summer. The plot of mixed timothy and alsike was very luxuriant, evidently this is a mixture well adapted to this section of country:—

Variety.	Sown.	Height.	Stage when Cut.	Yield of Hay per Acre.	
		Inch.		Tons.	Lbs.
Alfalfa, first cutting	1902	56	1/10 in bloom	2	800
" second cutting	1902	24	1/10 "	1	700
Total weight of two cuttings				3	1,500
Alfalfa, first cutting	1903	49	1/10 "	2	1,100
" second cutting	1903	24	1/10 "	1	100
Total weight of two cuttings				3	1,200
Alsike and Timothy	1903	37 to 44	Fully in bloom	3	200
Common Red Clover	1902	40	"	2	1,000

Several acres of clover were sown during May of this year, along with a light seeding of oats, with the intention of cutting the grain in a very early stage, but growth was unusually rank and the oats lodged before they could be harvested, and a large proportion of the clover plants were smothered. This land has been left in stubble and the condition of the clover will be noted next spring.

CLOVER ON LIGHT GRAVELLY UPLAND.

In May this year a number of plots of light upland soil were sown to alfalfa and common red clover, both with and without a nurse crop of grain. There was a good catch on all the plots, but the growth of clover was much weaker where a nurse crop was used. None of the clover on these plots was mown or pastured, but was left to hold the snow during the winter.

EXPERIMENTS WITH MILLETS.

Seven varieties of this useful family of plants were grown, they represented nearly all the leading types, and as usual they attracted much attention from visiting farmers.

Although it is advisable to have specimen plots here of all the leading varieties, there are actually only three kinds suitable for this country, viz., Hungarian, Common and Green Californian, the other four varieties are all too coarse for general use. Common Millet is the only one that has matured seed here, the others have always been caught by fall frost before maturity.

Millet is not a safe food for horses when fed in large quantities, but we have had excellent results from feeding one sheaf per day to each horse during the winter months. As soon as the head is formed the crop is cut and bound loosely, in small sheaves, with the grain binder, this is well cured in the stook, and stacked outside until required.

This year all the varieties were grown on summer-fallowed land, the soil was a rich black sandy loam; the size of the plots for this test was one-fortieth acre. All were sown on May 27 and cut on September 1.

Variety.	Description.	Height.	Stage when Cut.	Yield of Hay per Acre.	
		Inches.		Tons.	Lbs.
Algerian	Very coarse	72	A few heads only	6	200
Hungarian	Fine quality	48	In full head	4	1,200
White Round French	Coarse	55	Seed nearly ripe	4	800
Italian	"	47	Head just formed	3	1,800
Green Californian	Fine quality	48	Seed nearly ripe	3	1,400
Pearl or Cat Tail	Coarse	33	Not headed	2	1,800
Common	Fine quality	33	Seed nearly ripe	2	1,400

CATTLE.

The herd of cattle on the Experimental Farm now consists of eighteen animals, as follows:—

Name of Animal.	Breed.	Age.	Weight.
			Lbs.
Nancy	Shorthorn	5 years	1,510
Rose of Brandon	"	2½ "	1,290
Crocus	"	22 months	920
Daisy	"	16 "	840
James	"	9 "	660
Lily of Brandon	Ayrshire	3 years	1,295
Dentry	"	3 "	1,110
Haron	"	2 "	1,410
Snow Drop	"	11 months	620
Marie	Guernsey	3 years	770
Brandon Duke	"	14 months	760
Christie	Grade	5 years	1,210
Gretchen	"	7 "	1,625
Sis	"	2 "	1,050
Jenny	"	2 "	1,410
Margaret	"	23 months	970
Ruben	"	15 "	890
Julia	"	1 year	690

EXPERIMENTS IN FEEDING STEERS.

YEARLING STEERS COMPARED WITH TWO-YEAR OLDS.

This experiment was similar to that of last year's test, and the result is very much the same.

The twelve animals used for this experiment were Shorthorn grades of fair quality, purchased from a farmer near Oak river, Manitoba. Six of them were about 18 months old when feeding started, and the others about 30 months old.

They were purchased early in November, 1904, and cost, delivered at the barn, $3.25 per hundred pounds live weight, and sold in February, 1905, for $4 per hundred pounds.

The yearlings were not nearly as well finished as the two-year olds, and for export purposes would not have realized as much by 50 cents per hundred pounds, but all were killed in Winnipeg, and the purchaser gave the same price for each lot.

After two weeks of preparatory feeding they were divided into two groups according to age. All were tied in stalls and fed all they could eat up clean of the following ration:—

Straw	13 lbs.
Corn fodder	15 "
Corn ensilage	17 "
Swede turnips	10 "
Ground grain	4 to 9 "

DESCRIPTION OF FODDER.

The straw was mixed wheat, oat and barley. The fodder corn was principally Pearce's Prolific cut in the late milk stage and stooked in the field until wanted, both straw and corn fodder were cut into one-inch lengths.

The ensilage was also made from the above variety of corn, and was of excellent quality.

The grain was composed of one third each of barley, oats and wheat screenings.

A layer of cut fodder corn was first spread over the feed room floor, on this was placed successive layers of ensilage, sliced turnips, corn, straw and grain, it was then moistened with water and shoveled into a heap in the corner of the room, when fed 12 hours later fermentation had commenced and the mixture was quite warm.

The amount of grain fed was increased slightly each month until the test was completed.

COMPARATIVE GAINS.

—	Date.	Weight.	Gain.	Total Gain of six Steers.
One year old Steers.		Lbs.	Lbs.	Lbs.
Original weight of steers	Nov. 15, 1904	4,960		
Weight at end of 1st term	Dec. 13, 1904	5,350	390	1,170
" 2nd "	Jan. 10, 1905	5,545	195	
" 3rd "	Feb. 7, 1905	5 845	300	
" 4th "	March 7, 1905	6,130	285	
Two year old Steers				
Original weight of steers	Nov. 15, 1904	7,175		
Weight at end of 1st term	Dec. 13, 1904	7,500	325	975
" 2nd "	Jan. 10, 1005	7,735	235	
" 3rd "	Feb. 7, 1905	7,995	260	
" 4th "	March 7, 1905	8,150	155	

COST OF FEEDING.

Six yearling steers—

9,900	lbs.	of fodder corn at $4 per ton	$19 80
8,720	"	mixed straw at $1 per ton	4 36
6,549	"	turnips at 5 cents per bushel	5 45
11,118	"	ensilage at $2 per ton	11 11
3,996	"	ground grain at 75 cents per 100 lbs	29 97
			$70 69

Six two-year old steers—

10,000	lbs.	of fodder corn at $4 per ton	$20 00
8,880	"	mixed straw at $1 per ton	4 44
6,720	"	turnips at 5 cents per bushel	5 60
11,424	"	ensilage at $2 per ton	11 42
4,046	"	ground grain at 75 cents per 100 lbs	30 34
			$71 80

SUMMARY OF RESULTS.

—	First cost of each steer.	Value of feed consumed.	Price per steer sold.	Gain per day.	Profit per steer.
	$ cts.	$ cts.	$ cts.	Lbs. Oz.	$ cts.
One-year old steers	26 86	11 78	40 86	1 11	2 22
Two-year old steers	38 86	11 96	54 33	1 07	3 51

CONCLUSIONS.

The results of both this and last years' experiments would lead us to the following conclusions:—

1st. The amount of gain in weight per day is practically the same with each lot of steers.

2nd. The two-year olds were in both instances more profitable than the one-year olds.

3rd. There is very little profit in fattening steers when the difference between the buying price in the fall and the selling price in the spring is not more than $1 per hundred pounds.

MILKING COWS.

The accompanying table gives the length of the milking period and the weight of milk given by a number of the experimental farm cows for the past year:—

MILKING COWS.

Name.	Age.	Breed.	Milking Period.	Pounds of Milk.	Average each day.
Myrtle	6 years.	Shorthorn	285 days.	2,988½	10 lbs.
Nancy	5½ "	"	365 "	3,770	10 "
Alice May	5 "	"	300 "	5,381½	17 "
Denty	5 "	Ayrshire	305 "	5,278	17 "
Brandon Maid	4 "	Guernsey	298 "	6,407	21 "
Christie	7 "	Shorthorn Grade	343 "	9,326	27 "
Gretchen	6 "	" "	331 "	5,790	17 "
Carrie	9 "	" "	332 "	6,732½	20 "
Pet	7 "	" "	253 "	2,854½	11 "
Jennette	8 "	" "	313 "	6,039	19 "

EXPERIMENTS WITH SWINE.

The herd of swine on this farm consists of Yorkshire, Berkshire and Tamworth.

FEEDING PIGS ON BROME GRASS, PASTURE AND GRAIN.

This experiment was undertaken for the purpose of ascertaining the value of Brome grass pasture when supplemented with a limited amount of grain. Twelve pigs

were used for this test, they were about six weeks old when the test began, six were nearly pure Berkshire and the others cross-bred York and Berkshire. All were nose-ringed before being turned into the pasture and no damage was done to the sod.

The mixed grain consisted of equal parts of barley, oats and wheat screenings; this was ground and mixed with water and allowed to soak for a few hours before feeding. This mixture was used during the first few weeks and was replaced later with whole pease fed dry.

The mixed grain was valued at 75 cents per hundred pounds and the peasa $1 per hundred pounds. The pigs were valued at $2 each when the test began and were sold at $5.25 per hundred pounds, when the test was completed.

AMOUNT AND VALUE OF FEED CONSUMED FROM MAY 25 TO NOVEMBER 10.

—	Grain Fed.	Value of Feed.
Mixed grain chopped	900 lbs.	$6.75
Whole pease	700 "	7.00

SUMMARY.

—	Weight when Bought.	Value when Bought.	Weight when Sold.	Value when Sold.	Value of Grain Fed.	Profit.
12 pigs	360 lbs.	$24.00	1,355 lbs.	$71.13	$13.75	$33.38

POULTRY.

Three breeds of poultry are kept on the Experimental Farm, namely:—Barred Plymouth Rocks, White Wyandottes and Rose Comb Minorcas.

Both setting hens and incubators were used for hatching purposes, with the results slightly in favour of the hens. One hundred and ten chicks were raised in brooders with less than ten per cent of a loss.

WHOLE GRAIN COMPARED WITH GROUND GRAIN FOR FATTENING FOWLS.

Eight pure bred Barred Plymouth Rock cockerels were selected for this test. They were shut up in slatted pens each 2 x 3 feet. The grain fed was ¾ wheat and ¼ oats. It was finely ground for No. 1 pen and unground for No. 2 pen. In the estimate of cost grain has been valued at 75 cents per hundred pounds. The ground grain was mixed with water to the consistence of thin porridge.

—	Live Weight, Nov. 16.		Live Weight, Dec. 7.		Gain in 21 Days.		Cost of Food.	Cost Live Weight per lb.
	Lbs.	Oz.	Lbs.	Oz.	Lbs.	Oz.	Cts.	Cts.
Pen 1, fed ground grain	20	10	24	10	4	00	24	6
Pen 2, fed unground grain	20	13	23	13	3	00	21	7

CONCLUSIONS.

First, pen 1 consumed 4 pounds more feed than the others.

Second, pen 1 gained twenty-five per cent more flesh than No. 2.

Third, the ground feed produced flesh at 6 cents per lb. and whole grain at 7 cents per pound.

EXPERIMENTS WITH BEES.

Owing to the unusually open fall last year the bees were not placed in their winter quarters until November 28. One corner of the dwelling house cellar is used for this purpose; it is partitioned off from the rest of the cellar and kept quite dark, the temperature is regulated by means of a chimney flue, which is opened or closed as required. The bees are not placed in the cellar until the temperature here is below 50° above zero. During the winter the temperature is kept between 32° and 47°, it usually registers about 40°.

All of the 14 colonies placed in the cellar survived the winter, and with few exceptions they were in excellent condition when placed on their summer stands, on March 24 of this year. All were weighed when placed in their winter quarters and also when set out. There was a large variation in the amount of honey consumed by each colony, the highest was 28 pounds and the lowest 6 pounds. The average consumption per colony was 14 pounds.

The first pollen was obtained from the *Anemone patens* on April 7. Willow pollen was first gathered on April 21. The first honey was removed from the hives on June 12 and the first swarm appeared on June 28.

Thirty-eight pounds of extracted honey was produced per colony, spring count, and eight new swarms obtained.

Bees were noticed for the first time working on the Buffalo berry (*Shepherdia argentea*).

A TEST OF WINTER VENTILATION.

When placed in the cellar 9 of the hives were without cloth coverings and the board covers were raised half an inch above the hive sides, thus giving free ventilation through the hive. These 9 hives consumed an average of 15½ pounds of honey per hive.

On the other 5 hives the cloth covering was removed also, but the board covers rested tightly on the sides of the hive, thus allowing very little air to pass through the hive. These 5 hives only consumed 12¼ pounds of honey, or 3 pounds less than the others. In both cases the entrances were left wide open. Apparently it is not necessary to have a current of air passing through the hive, providing the cellar is kept well ventilated.

WORKING FOR A LARGE YIELD OF EXTRACTED HONEY.

The summers of this province are short, and one of the greatest apiarian problems is to produce the maximum yield of honey in this short period. Last summer two of our colonies, Nos. 3 and No. 4, were in excellent shape for a large production, they were both large early swarms of this summer from two pure Italian colonies; they were hived on empty combs and were given another super of empty combs a few days after swarming. These combs were extracted as follows:—

					Lbs.
On August 16, No. 4 gave					20
"	18	"	4	"	20
"	21	"	4	"	15
"	24	"	4	"	22
"	28	"	4	"	26
Total for 12 days					103

					Lbs.
On August 18, No. 3 gave					15
"	21	"	3	"	19
"	24	"	3	"	18
"	28	"	3	"	18
Total for 10 days					70

None of the combs were sealed over, but the honey was of good quality, and not at all watery.

HORTICULTURE.

APPLES.

I take pleasure in reporting some further progress in apple culture. This season in addition to a large crop of crab apples amounting to over 45 bushels, two varieties of Standard apples fruited, viz., Hibernal and Duchess of Oldenburg, also a very large number of crosses between the standard apples and the crabs.

For some years a considerable amount of both root and top grafting has been carried on here, using as stock the Berried crab (*Pyrus baccata*), a hardy and readily propagated crab apple, and scions from varieties which showed special adaptability to our somewhat rigorous climate. This work has resulted in the production of some very promising fruit and gives us every reason to hope that in a few years we will have a number of varieties of apples hardy in all parts of Manitoba.

The tree of Hibernal was root grafted on Berried crab stock in 1901. Although growing in a much exposed position it showed only a slight injury on the tips of the branches from winter killing. The fruit was about 3½ inches in diameter, and was of good flavour and excellent for cooking purposes.

The Duchess of Oldenburg which fruited was the result of top grafting on the Berried crab. The fruit was about 2½ inches in diameter free of scab, of good colour and flavour.

Among the other trees that fruited for the first time were some excellent Martha crab seedlings, one in particular named 'Maggie' is of considerable promise, the flavour greatly resembles that of a standard apple.

Each fall the fruit of all the Berried crabs grown on the farm is pulped and the seed sown. This year several thousand seedlings of this tree were grown and will be available for grafting next spring.

TRANSCENDENT CRAB.

Most of the trees of this variety that fruited during the year were top grafted on large *Pyrus baccata* trees in the spring of 1903. The branches were loaded with fruit free of scab and of excellent size and flavour. The successful production of this fruit

in all parts of Manitoba would of itself prove a great boon to the settlers of the province.

PLUMS.

The orchards of this fruit now consist of 358 trees, most of which are selected native seedlings, but there are also a few named varieties and seedlings of the American group.

Native Manitoba Plum.—These are much earlier than any other plums grown here, many of them ripening their fruit by August 15. Like all seedlings they vary greatly. From many hundreds grown here, about ten are of superior excellence; these are being propagated and some of them will be available shortly, for testing in other parts of Manitoba.

CURRANTS.

Thirty-three varieties of currants were grown here this season, most of which produced a fair crop. Just as the fruit commenced to ripen the currant worm appeared but it was quickly checked by a spraying of Hellebore and water. The accompanying table gives the names of the varieties grown, together with the yield and quality of the fruit.

Variety.	Colour.	Flavour.	Length of Bunch.	Fruit on Bunch.	Weight from one Bush.
			Inches.		Lbs.
Defiance	Red	Sweet	2½	Well set	1¼
Houghton Castle	"	"	2¼	Thick set	1½
Large Red	"	Fairly sweet	2½	"	2½
Simcoe	"	Acid and juicy	2	Thinly set	1½
Pomona	"	Sweet, very juicy	2½	Thick set	3¼
Long Bunch Holland	"	Sweet and juicy	2		1¾
Prince Albert	"	"	2	Thinly set	1¼
Red Dutch	"	"	2	Thick set	2
New Red Dutch	"	"	1¾	"	3
Goliath	"	"	1½	"	1¼
North Star	"	"	2¼	"	1¾
Admiral	White	"	2½	"	2¾
White Imperial	"	Slightly acid	2¼	"	1½
Climax	"	Sweet	2	"	1½
Large White	"	"	2½	"	2¾
White Cherry	"	" thin skin	2¼	"	3
Verriers White	"	Very sweet	3	Thinly set	3
White Dutch	"	Fairly sweet	2½	"	1½
White Kaiser	"	Sweet	2½	Thick set	1
White Grape	"	Slight acid	2½	"	1¼
White Pearl	"	Fairly sweet	2	"	¾
Wentworth's Leviathan	"	Sweet	1½	Thinly set	1½
Prince of Wales	Black	Good thin skin			3¼
Black English	"	Juicy "			1½
Sterling	"	" "			2
Star	"	Fairly sweet and juicy			1¼
Kentish Hero	"	Sub-acid and juicy			¾
Eagle	"	" "			1
Standard	"	Sweet dry thin skin			2¼
Winona	"	" thin skin			1
Baldwin's Black	"	Juicy thick skin, sub-acid			¾
Dominion	"	Sub-acid, dry			1
Percy	"	Sweet juicy thick skin			¾

GOOSEBERRIES.

Twenty-five varieties of gooseberries were grown here this year. Nearly all the varieties were heavily laden with fruit of excellent flavour and fair size.

STRAWBERRIES.

A number of Alpine strawberries were received from the Central Experimental Farm in the spring of 1904 and made fine growth before winter set in, they were then covered with a light coat of strawy manure, and during the season bore a fair quantity of fruit, but these were eaten by birds before they were ripe.

RASPBERRIES.

The raspberry crop this season was very good, the yield being much above the average. Every fall the canes are bent over and covered with manure in order to prevent winter killing. The following are the varieties which have proven the best both in quantity and quality: Cuthbert, Reider, Climax, Turner, Empire, Sarah, Niagara and London.

AVENUES.

The avenue trees on this farm are mostly native ash-leaf maples. Where the soil is not too wet and is fairly free of alkali they are quite thrifty, but several vacancies have occurred owing to wet land or alkaline soil. One of the best avenues is composed of a double row, native white spruce on the outside and maples on the inside. This avenue is attractive both in summer and winter.

The Russian poplar avenue on the eastern boundary of the Farm is still growing vigorously. During the summer months its dark green foliage and glossy leaves are distinguishable at a long distance, a few of the trees show signs of canker.

Cottonwood trees have only succeeded here, when planted close to running water, on high, well drained land they have invariably rusted badly, for this reason they have not been used for avenue purposes.

ARBORETUM.

A considerable addition was made to the stock of trees during the past season. All were received from the Central Experimental Farm in the spring. These consisted of pines, cedars, silver firs, junipers and several flowering shrubs, including Philadelphus in variety and Syringa Amurensis, these were planted in the Arboretum around the superintendent's house, and all made good growth during the season.

FALL AND SPRING SOWING OF MAPLE SEED.

Until last year we have usually sown native maple seed in the spring, but an experiment was made during the fall of 1904 to ascertain if any advantage accrued from autumn sowing.

From one row 270 feet long of spring sown seed 2,600 trees were obtained while only 900 trees grew in the adjoining row sown in the fall, this was due largely to the last named germinating early in spring and then freezing off close to the ground.

VEGETABLE GARDEN.

PEASE—A TEST OF VARIETIES.

Forty-eight varieties of pease were sown in the open on May 9. Germination was excellent except with the following varieties: Admiral, Extra Early Leviathan, Dwf. Telephone, and Sharpe's Queen.

All of the following varieties ripened their seeds. The accompanying tables are arranged in order of earliness:—

PEASE—TEST OF VARIETIES.

Number.	Varieties.	Sown.	Blossom	Length of Pod.	Length of Vine.	Pease in Pod.	Flavour.	Ready for use.	Productiveness.
				In.	In.				
1	E. E. Philadelphia	May 9	June 16	2¾	42	7– 8	Sweet	July 15	Fairly.
2	Gregory's Surprise	" 9	" 23	3	36	6– 8	"	" 10	"
3	First of All	" 9	" 20	2¾	30	7	Poor	" 12	"
4	Extra Early Market	" 9	" 16	2½	36	7– 8	"	" 15	"
5	American Wonder	" 9	" 23	3	24	7	Good	" 15	Very.
6	Nott's Excelsior	" 9	" 23	3	24	6– 8	Very sweet	" 15	"
7	Alaska	" 9	" 23	3	42	6	Poor	" 15	Not.
8	Best Extra Early	" 9	" 16	2	24	6	"	" 15	Very.
9	Prosperity	" 9	" 20	3½	48	8– 9	Very sweet	" 18	Not.
10	Duke of York	" 9	" 23	4	48	7– 9	Sweet	" 20	Very.
11	Duke of Albany	" 9	" 23	4½	72	8– 9	Very sweet	" 20	"
12	Thomas Laxton	" 9	" 23	3	36	6	Good	" 20	Fairly.
13	Sutton's Excelsior	" 9	" 23	3	24	6– 7	Very good	" 20	"
14	Rivenhall Wonder	" 9	July 5	4	24	4– 6	Very sweet	" 22	"
15	Sutton's Satisfaction	" 9	" 5	3	36	4– 6	"	" 22	"
16	Fill Basket	" 9	" 5	3½	30	7– 9	"	" 22	Very.
17	Telephone	" 9	" 5	4½	54	8–10	Very good	" 22	"
18	Premium Gem	" 9	" 25	3	30	4– 6	Poor	" 22	Not.
19	Dwarf Champion	" 9	" 5	3½	30	6	Sweet	" 24	Fairly.
20	Prince of Wales	" 9	" 5	2¾	36	4– 7	Very sweet	" 24	"
21	McLean's Blue Peter	" 9	June 30	2½	24	6	Sweet	" 24	"
22	Extra Early Exonian	" 9	" 30	2½	36	6	"	" 22	Very.
23	William Hurst	" 9	" 23	3	24	8	Very sweet	" 20	"
24	Petit Pois	" 9	July 5	3½	36	10	Poor	" 24	"
25	S. B. Everbearing	" 9	" 5	3	36	4– 6	Fairly sweet.	Aug. 1	Fairly.
26	McLean's Little Gem	" 9	June 30	3	48	6	"	" 1	"
27	Shropshire Hero	" 9	July 5	3	48	8	Very sweet	" 1	"
28	British Empire	" 9	June 30	4½	36	10	Sweet	" 1	"
29	Hor. Market Garden	" 9	July 5	3	36	9	Fairly sweet	" 1	Very.
30	Pride of the Market	" 9	" 5	4	36	9	"	" 1	Fairly.
31	Imp. Stratagem	" 9	" 5	3½	36	5– 8	Very sweet	" 1	Very.
32	Heroine	" 9	" 5	4	48	8	Sweet	" 1	Fairly.
33	Yorkshire Hero	" 9	" 5	3½	30	5	Very sweet	" 1	"
34	Queen Pea	" 9	June 25	4½	48	9	"	" 1	"
35	Abundance	" 9	July 5	2½	36	6	Fairly sweet	" 1	Very.
36	Burpee's Profusion	" 9	" 5	3½	48	5	Sweet	" 1	"
37	Juno Pea	" 9	" 5	3½	36	8	Poor, dry	" 12	"
38	Telegraph	" 9	" 5	4	48	7	Dry	" 1	Fairly.
39	Laxton's Alpha	" 9	June 30	2½	48	7	Poor	" 1	"
40	Reliance	" 9	July 6	3	60	5	Sweet	" 1	Very.
41	Champion of England	" 9	" 5	3½	72	6	Fairly sweet	" 5	"

CUCUMBERS.

Twenty-nine varieties of cucumbers were sown in the open on May 23, in hills six feet apart each way. Although they were greatly injured by the June frost a very heavy crop of fruit was harvested.

The following is the result of this test:—

Varieties.	Productiveness.	Length.	Diameter.	Colour.	Ready for Use.	Weight.	Flavour and Texture.
		In.				Ozs.	
Arl. Ely. White Spine	Moderately.	6	3	Lt. green.	Aug. 1	11	Good.
New Siberian	Very	6	3¼	"	" 1	12	Fair.
Green Prolific	"	5½	2¼	Dk. green.	" 3	9	V. good.
Paris Pickling	Productive	8	3	Lt. "	" 8	11½	Good.
Cool and Crisp	Med	7	2¾	Dk. "	" 8	8	Fair.
Ely. White Spine	V. prolific	8	2⅓	" "	" 8	9	V. good
S. B. Evergreen	Productive	7	2⅓	" "	" 11	7	"
Cumberland	Very	8	2¾	Lt. "	" 11	12	"
Boston Pickling	Fairly	6¾	2½	Dk. "	" 11	8	Good.
White Wonder	Very	7	3	White	" 11	10	Very.
Evergreen Cluster	"	6½	2½	Lt. green.	" 11	7	Fair.
Short Green	Fairly	6	2¼	"	" 14	6	"
Imp. Long Green	Very	8	3	Dk. green	– 14	9	V. good.
Chic. Westerfield	"	5	3	"	" 14	8	Fair.
New Orleans	"	8	3	Lt. "	" 14	10	V. good.
Prince	"	8	3	"	" 14	12	"
Hills F. W. Spine	Fairly	8	3	"	" 14	11	"
Jap. Climbing	Mod	6	2	"	" 14	7	Poor.
Tailby Hybrid	Fairly	7	2⅓	"	" 14	6	Good.
Short Green Gherkin	"	5½	2¼	Lt. "	" 14	7	Fair.
Farquhar's Perfection		6	3	"	" 14	8	Good.
Thorburn's Everlasting	Very.	5¼	3	"	" 14	5½	Fair.
Pride of Canada	V. prolific.	11	2½	White	" 14	12	V. good.
Nichol's Med. Gem	Not	5¼	3	Green	" 14	6	Good.
Giant Pera	Prolific	10	3	Lt. green.	" 14	12	Excellent.
Long Green Turkey	Productive	8½	3	Dk. "	" 14	10	V. good.

ONIONS.

Six varieties of onions were sown on March 29 in rows 12 inches apart, by hand. The germination was good in all cases and the varieties gave about an average in yield and quality.

The following gives the result of this test arranged in order of productiveness:—

Variety.	Sown.	Pulled.	Colour.	Shape.	Average Weight of Bulb.	Yield per Acre.
					Oz.	Bush.
Danver's Yellow Globe	Mar. 29	Sept. 18.	Light yellow	Globular	5½	517
Trebon's Large Yellow	"	"	" "	Globe	6	594
Red Wethersfield	"	"	Dark red	Flat	7½	528
Market Favorite Keeping	"	"	Dark yellow	"	4⅓	176
Australian Yellow Globe	"	"	Light "	Globular	4½	513

SQUASH AND PUMPKINS.

Five varieties of squash and pumpkins were sown in the open on May 15, in hills 8 feet apart each way. The late spring frost prevented the best results being obtained, although a fair crop was harvested, the varieties coming quite up to their average size. The following results were obtained:—

Varieties.	Sown.	Texture and Flavour.	Ripeness.	Average Weight.
			p. c.	Lbs.
Orange Marrow	Yellow	Very good	90	7½
Long White Bush Marrow	Yw. white.	"	100	13
English Vegetable Marrow	" "	"	95	11
Field Pumpkin	Yellow	Very coarse.	85	25
Sweet or Sugar Pumpkin	Dk. yellow.	" good	90	6

FRENCH BEANS.

Seven varieties of beans were sown in the open on May 13, in rows 30 inches apart, but on account of the June frost rather a light crop was obtained.

The results of this test are given below. The varieties being arranged in order of earliness:—

Varieties.	Sown.	Ready for use.	Length of pod.	Productiveness.
			Inches.	
Dwf. Matchless	May 13	July 27	6	Very good.
Fame of Vitry	" 13	" 27	7	" "
Dwf. Extra Early	" 13	" 29	6⅓	Prolific.
Dwf. B. Speckled	" 13	" 29	7¼	Fairly.
Dwf. Early China	" 13	" 27	6	Very productive.
Emperor of Russia	" 13	" 29	6	" "
B. B. Arlington Windsor	" 13	" 25	5	" "

PARSNIPS.

One variety of parsnips was sown on April 3, one foot apart, by hand, and lifted October 19. The variety was Hollow Crown, and the yield per acre was 946 bushels.

CARROTS.

Three varieties of carrots were sown in the open on May 11 in rows one foot apart. The yield of all the varieties was an average one.

CABBAGE.

Eight varieties of cabbage were sown under glass on March 28, and transplanted to the open on May 15. All did well.

The following table gives the results of the test:—

Varieties.	Sown.	Planted out.	Ready for use.	Description.	Average weight.
					Lbs.
Paris Market	March 28	May 15	June 25	Solid.	6½
Express	" 28	" 15	" 25	"	7¼
Early Jersey Wakefield	" 28	" 15	July 20	V. solid.	7
Fottler's Improved	" 28	" 15	" 20	"	6
Winnigstadt	" 28	" 15	" 31	"	7½
Savoy Cabbage	" 28	" 15	" 31	V. good	6½
Large flat Drumhead	" 28	" 15	Aug. 15	Solid.	12
Marblehead	" 28	" 15	" 25	Coarse.	14

SWEET CORN.

Five varieties of corn were sown this year. Squaw corn was the only variety which ripened.

The following are the results obtained from this test:—

Varieties.	Sown.	Ready for use.	Flavour.	Seed ripened.
Squaw Corn	May 13	August 5	Good	Sept. 20.
New Premo	" 13	" 15	Very good	Did not ripen.
Extra Early White Cory	" 13	" 15	" "	" "
Sweet Peep O'day	" 13	" 20	Good	" "
New Windsor	" 13	" 23	"	" "

GARDEN TURNIPS

Four varieties of turnips were sown in the open on May 11, by hand, in rows 2 feet apart. The yield per acre has been calculated from the yield of one row 66 feet long.

Variety.	Sown.	Ready for use.	Shape.	Flavour.	Lifted.	Yield per Acre.	
						Tons.	Lbs
Robertson's Golden Ball	May 11	July 1	Round	Good	Sept. 20	49	1000
Extra Early White Milan	" 11	" 1	Flat	Fairly good	" 20	12	1080
Early Stone	" 11	" 1	"	Fair	" 20	36	270
E. W. S. A. Stone	" 11	" 1	Round	"	" 20	29	1400

BEETS.

Three varieties of beets were sown in the open on May 11, in rows 2 feet apart, and were lifted September 19. Average yield per acre, 31 tons.

TOMATOES.

Two varieties of tomatoes were sown under glass and transplanted to the open on June 1. These were all killed with the June frost, but were replaced with a fresh lot of plants, and they produced a large quantity of ripe fruit.

CAULIFLOWER.

Three varieties were sown under glass March 28, and transplanted to the open May 15. The following are the results obtained:—

Variety.	Sown.	Planted out.	Ready for use.	Description.	Average weight.
					Lbs.
Early Snow Ball	March 28	May 15	June 24	Good	3½
Half Early Paris	" 28	" 15	" 30	Very good	3¾
Dwarf Erfurt	" 28	" 15	July 15	" "	3½

RHUBARB.

Eighteen varieties of this useful plant were grown here for testing purposes this season. All varieties did well.

The following are the results obtained:—

Variety.	Colour.	Texture.	Weight per Plant.	Flavour.
			Lbs.	
Samyster's Prince of Wales	Light red	Soft	12	Very good, juicy.
Early Scarlet	Deep red	Crisp	12	Good.
Early Prince	Light red	Very crisp	21	Juicy.
Tobolsk	"	Crisp	36	Acid.
Paragon	Greenish	Stringy	23	Very acid.
Prince Albert	"	Crisp	37	Sweet.
Magnum Bonum	Light red	"	39	Good.
Brabant's Colossal	"	Stringy	41	Poor.
Early Crimson	Greenish	Soft	24	Very tart.
Scarlet Nonpareil	Red	Crisp	36	Juicy.
General Taylor	Green	Stringy	29	Poor.
Giant	Red	Tender	43	Juicy.
Salt's Perfection	Green	Very poor	9	Poor.
Royal Albert	Deep red	Crisp	22	Acid.
Strawberry	Light red	Tender	30	Good.
Tottle's Improved	Light green	Crisp	28	Very good.
Victoria	Light red	"	37	Good.
Myatt's Linnæus	"	Tough	47	Fairly good.

FLOWER GARDEN.

A large number of annuals were, as usual, sown in shallow boxes under glass and transplanted to the flower garden on June 1, most of them made a fine display of varied colours. Some difficulty was experienced in bringing some of the seedlings through safely. On account of late spring frosts Balsams, Zinnias and Tagetes were completely destroyed on April 30 in spite of the protection afforded by a thick covering of canvas. A second sowing on April 30 produced good strong plants, which were soon available for planting.

ANNUALS SOWN OUTSIDE.

The following mixed collection of annuals sown in the open on May 10 made a fine colour effect, visitors frequently expressing their admiration of the charming display:—

Clarkia mixed,
Coreopsis,
Candytuft,
Abronia umbellata,
Godetia,
Portulaca double,
Poppies mixed,
Gypsophila elegans,
Nasturtium mixed,
Sweet Alyssum.

TENDER PERENNIAL BULBS.

A test was made last year of tender bulbs to ascertain the possibility of flowering some of the more tender kinds, such as Hyacinths, Narcissi, &c., by using a heavy covering of strawy manure. The covering was taken off in the spring. Most of the bulbs on examination were found to be rotten, the Narcissus, however, came through safely and produced some magnificent blooms. The varieties saved were Sir Watkin and Emperor. A fine lot of different varieties of bulbs have been added to the collection this season; these have been planted in beds and borders.

IRIS KAEMPFERI (*Japan Iris*).

A valuable addition to our collection of this beautiful perennial was received from the Central Experimental Farm at Ottawa, in the spring of 1905 and planted in the perennial garden. These produced some very fine specimens of blooms, which were greatly admired. The following is a list of those that flowered:—

Name.	Colour.	Number of Petals.	Diameter of Flower.	Height.	Time of Flowering.
			Inches.	Inches.	
Kasu-gano	Light blue	6	6	15	July 30.
Shiye-no-yuki	Purple	3	5	15	" 30.
Datedogu	Pink	5	6	18	" 30.
Koki-no-iro	Purple	6	6	15	" 30.
Senjo-no-hora	Pink striped	6	5	12	Aug. 2.
Tsutsu-izutsu	P. Wh. striped	6	6	12	" 2.
Sumida-gawa	Whitish	3	6	15	" 2.
Goko-no-asobi	Purple	8	4	14	" 2.

PAEONIA OFFICINALIS (*Herbaceous Paeonies*).

We would again call particular attention to this king of hardy herbaceous perennials often erroneously called 'Piney Rose.' It is a matter of regret that although

adapted in every way to the climatic conditions of the west comparatively few can be found throughout Manitoba. With a constitution that obviates the necessity of the slightest protection and increasing in size of plant and number of blooms from year to year, a few plants give such generous returns for a small expenditure of labour.

The Paeony begins to bloom toward the end of June and continues throughout July with flowers ranging from 8 to 10 inches in diameter of various colours, many of them possessing a delicate perfume. They present a mass of colour, which never fails to elicit the greatest admiration. Some of the clumps on the Experimental Farm are now 4 to 6 feet in diameter and produce annually an average of 30 to 40 flowers each, perfectly double and of the most delicate colouring and texture. It is a fact worthy of note that although many of the clumps growing on the farm have remained in the same position since planting (eight to ten years ago) that they show no symptoms of deterioration, which is quite contrary to the general opinion that they require lifting and dividing every few years.

Many varieties can now be purchased having a wide range of colour and form, this fact, combined with their exceeding hardiness and freedom from disease, places them in the foremost rank of our hardy herbaceous perennials. We may mention that propagation is effected by division of the root in a similar manner to that of rhubarb.

DISTRIBUTION OF GRAIN, POTATOES, FOREST TREES, SHRUBS, &c

Seedling trees and shrubs	pkgs.	600
Potatoes in 3-lb. bags		206
Wheat in 3-lb. "		131
Oats in 3-lb. "		100
Barley in 3-lb. "		40
Pease in 3-lb. "		72
Maple seed in 1-lb bags		80
Rhubarb seed	pkgs.	33
Total		1,229
Number of farmers reporting on their experience with oats		15
" " " " wheat		11
" " " " barley		5
" " " " potatoes		42
" " " " pease		5
Largest yield obtained from 3 lbs. wheat (Preston)		110 lbs.
" " 3 " oats (Banner)		101 "
" " 3 " barley (Odessa)		72 "
" " 3 " potatoes (Uncle Sam)		272 "
" " 3 " pease (English Grey)		55 "

VISITORS.

Owing to the great interest taken in the agricultural advancement and possibilities of this country, and the increased importance of the city of Brandon as a centre for farming purposes, the number of visitors to the Experimental Farm is increasing every year. It is estimated that over 18,000 visitors called at the farm during the past year. A large number of these were parties examining the country with the idea of becoming settlers in the west.

The farm was also visited by a number of the leading newspaper correspondents of the United States, and favourable comments were made on the work of this farm by the newspapers they represent.

Many excursion trains were run to the farm from towns on the main line of the Canadian Pacific Railway, also from along the line of the Pembina branch.

FARMERS' MEETINGS.

During the year more farmers' meetings were attended by me than usual. The attendance at these meetings was generally large, and considerable interest was shown in the subjects discussed. Meetings were attended and addresses given at the following places:—

Portage la Prairie	December 12, 1904
Winnipeg	January 25, 1905
Brandon	February 8, 1905
Minnedosa	" 16, 1905
Winnipeg	" 24, 25, 1905
Deloraine	May 29, 1905
Melita	" 30, 1905
Hartney	" 31, 1905
Souris	June 1, 1905
Reston	" 2, 1905
Virden	" 3, 1905
Portage la Prairie	" 13, 1905
Rapid City	" 15, 1905
Portage la Prairie	October 29, 1905

Meteorological Tables for Brandon, Man.

Months.	Highest Temperature.		Lowest Temperature.		Total Rainfall.	Total Snowfall.	Total Sunshine.
1904.	Day.	Deg.	Day.	Deg.	Inches.	Inches.	Hours.
December	29	40	27	—34		2	61·7
1905.							
January	18	30	10	—45		8	118·4
February	27	47	2	—43		½	165·
March	25	60	10	—21	·72	3½	57·3
April	25	78	30	11	·06		215·1
May	31	80	5	21	2·59	2	208·6
June	3	86	10	31	4·53		187·5
July	10	87	24	39	4·06		297·6
August	3	85	23	39	2·37		249·4
September	27	87	24	33	3·02		206·3
October	3	73	28	—3	·15	5	124·4
November	10	56	30	—24	·11	½	88·5
					17·61	21½	1,979·8

SAMPLES FOR EXHIBITION.

A number of samples have been prepared for the immigration offices and for exhibitions held in Europe and other places.

The Department of the Interior was also supplied with a quantity of grain and grasses for the same purpose.

CORRESPONDENCE.

During the past year 4,783 letters were received and 3,140 despatched, irrespective of circulars sent out.

I have the honour to be, sir,
Your obedient servant,

S. A. BEDFORD,
Superintendent.

EXPERIMENTAL FARM FOR THE NORTH-WEST TERRITORIES.

EXPERIMENTAL FARM, INDIAN HEAD, SASK.,
November 30, 1905.

Dr. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit to you the eighteenth annual report of the operations of the Experimental Farm for the North-west Territories at Indian Head, Sask., during the year 1905.

The past season has been, without an exception, the most favourable for grain of all sorts the Territories have ever experienced. In past years, over so wide an extent of territory, some districts or large sections of country would have more or less poor crops. This year, however, all rejoice in a most bountiful harvest. In many places the crop was excessively heavy, causing considerable expense in securing it.

Very little snow fell during last winter, and after February 14 little or no severe weather took place. Seeding could have been done in any part of the Territories during the last half of February and all of March, and in some cases grain was sown within this period.

April opened very fine, and seeding became general over the whole country the first few days. During the month one or two cold spells occurred, but did not interfere with seeding, which was completed early, and better than for many preceding springs.

Grain as a rule germinated early and evenly, and under heavy showers and warm weather in May and June growth was very rapid, and in some districts very rank.

Harvest commenced from August 20 to 25, as a rule, with some districts a few days earlier. Unfavourable weather, with heavy showers, retarded the cutting. No delay in harvesting took place from backward growth, as the grain all ripened evenly and fast.

On September 4 the temperature was very near the freezing point, and no doubt, from results shown by threshing, did reach that point in some places. The first frost shown by instruments on the Experimental Farm was on Tuesday, September 12, when one degree was recorded.

From the excessive quantity of straw, and unfavourable weather, threshing has been both tedious and expensive this fall, and at the present time considerable has yet to be done. Very heavy yields are being obtained everywhere, showing the wonderful fertility of the soil when conditions are favourable.

EXPERIMENTAL FARM CROPS.

The crops on the Experimental Farm have never been so uniformly good as they were this year. Some of the uniform test plots of wheat, through being too heavy, lodged badly and rusted, and were considerably injured, especially in the sample. All field crops, whether grain or roots, were good both in yield and quality. Straw in many cases lodged badly, but chiefly from heavy rain after filling, and the returns do

not seem to have been lessened, though the cost of harvesting was increased, as nearly every acre on the farm had to be cut one way.

Barley harvest commenced August 11, and everything was in stook on September 8.

EXPERIMENTS WITH WHEAT.

Thirty-four varieties of wheat were sown in uniform plots of one-twentieth acre on April 6 on fallowed land. In all cases the yield of straw was excessive and lodged badly, and the early sorts were struck by rust and injured to a great extent.

The land on which the uniform plots of wheat, oats and barley were sown was manured for roots three years ago, which no doubt was one of the causes of the excessive yield of straw on all the plots, and probably helped the rust in its work.

Spring Wheat—Uniform Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bush. after cleaning.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Minnesota No. 163	Aug. 28	144	54	Medium	3½	Bald....	6,040	46	..	61
2	Huron (Ottawa Seed)	*	....	50	Weak ..	4	Bearded	6,040	43	40	56
3	Haynes' Blue Stem, Minn. 169	" 31	147	51	Medium	4	Bald....	5,080	43	40	61½
4	White Fife	" 31	147	51	Weak ..	4	" ...	6,800	43	20	59½
5	McKendry's Fife, Minn. 181	" 31	147	55	Medium	4⅛	" ...	7,820	43	..	59
6	Bishop	" 26	142	47	Weak ..	3⅝	" ...	5,740	43	..	59
7	Wellman's Fife	" 29	145	59	Medium	4½	" ...	4,540	43	..	56¼
8	Dawn	" 19	135	51	" .	3½	" ...	6,700	41	40	54½
9	Percy (Ottawa Seed)	" 25	141	53	" .	4	" ...	6,900	41	40	56
10	Australian No. 9	" 28	144	52	" .	4	" ...	7,980	41	20	60½
11	Stanley (Ottawa Seed)	" 25	141	53	" .	4¼	" ...	6,180	40	20	56
12	Laurel (Ottawa Seed)	" 28	144	52	Weak ..	4⅛	" ...	5,380	40	20	57
13	Power's Fife, Minn. 149	" 30	146	51	" ..	3¾	" ...	4,380	40	20	61½
14	Huron (Indian Head Seed)	*	....	53	" ..	4	Bearded	7,800	40	..	55⅕
15	Laurel " "	" 29	145	52	Medium	4⅛	Bald...	7,420	39	40	56½
16	Stanley " "	" 25	141	54	" .	4½	" ...	5,320	38	..	55¼
17	Chester	" 26	142	52	Weak ..	4	" ...	5,320	38	..	56½
18	Preston (Ottawa Seed)	*	...	50	" ..	4	Bearded	6,140	37	40	57
19	Red Fife	" 29	145	50	Medium	3¾	Bald....	5,740	37	40	59¼
20	Preston (Indian Head Seed)	*	.....	54	" .	4	Bearded	8,280	35	20	56
21	Monarch	" 30	146	53	" .	4	Bald....	4,900	35	..	60
22	Countess	*	.....	51	Weak ..	4	" ...	7,000	33	20	53¼
23	Colorado	" 26	142	51	" ..	4½	Bearded	5,140	31	..	59¼
24	Clyde	*	...	56	Medium	4	Bald....	6,380	30	20	51½
25	Advance	" 25	141	49	Strong..	4	Bearded	7,200	30	..	54½
26	Percy (Indian Head Seed)	" 25	141	50	" ..	4	Bald....	4,620	29	40	55
27	Pringle's Champlain	" 26	142	50	Medium	4¼	Bearded	7,520	28	..	58½
28	Red Fern	" 27	143	52	" .	4⅕	" .	6,740	27	40	58
29	Herisson Bearded	" 27	143	50	" .	2½	" .	7,600	26	40	59
30	Riga	" 19	135	52	" .	3½	Bald....	5,040	24	20	50
31	Downy Riga	" 19	135	47	Weak ..	3	" ...	4,720	23	40	59
32	Weldon	" 27	143	54	Medium	4¼	" ...	4,800	23	20	50
33	Early Riga	" 19	135	48	" .	3½	" ...	4,140	20	..	50
34	Hungarian White	*	....	51	Strong..	4	Bearded	8,700	16	40	57½

* These varieties were not fully ripe when cut, but were cut on account of being badly affected with rust. Number of days from sowing to cutting, 135.

WHEAT—TEST OF VARIETIES IN FIELD LOTS.

Nine varieties of wheat were sown in field lots, on fallowed land, clay loam, at the rate of 1½ bushels seed per acre. Huron and Preston, sown alongside each other, gave

the best yields this year. Huron was almost entirely lodged, and alongside of a hedge was rusted slightly. Percy and Stanley were injured by winds in the spring to some extent, causing the yields to be below what they otherwise would have been. Preston was ripe 9 days earlier than Red Fife, which was sown one day earlier in April.

Wheat—Test of Varieties in Field Lots.

Name of Variety.	Size of Plot.	Date of Ripening.	No. of Days Maturing.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
	Acres.			In.		Bus.	Lbs.	Lbs.	
Huron	5	Aug. 23.	140	3½	Bearded	47	12	62	Considerably on leaves.
Preston	10	" 21.	139	4	"	46	54	62½	" "
Laurel	5¼	Sept. 1.	151	3½	Bald	42	26	57½	Slightly on leaves.
Red Fife	5⅓	" 1.	151	3¼	"	42	3	61	" "
White Fife	4⅔	" 1.	150	3½	"	37	35	59½	Badly "
Percy	5¼	" 22.	141	3½	"	32	53	59	Slightly "
Riga	¼	" 19.	135	3	"	32	..	60	Badly "
Early Riga	¾	" 20.	138	3	"	31	50	60	Considerably on leaves.
Stanley	5¼	" 22.	141	3¼	"	31	4	59	Slightly on leaves.
Pringle's Champlain	2	" 29.	147	4½	Bearded	28	28	62	Considerably on leaves.

Wheat Crop and Average Yield.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Huron	Fallow	5	47	12	236	..
Preston	"	10	46	54	469	..
Laurel	"	5¼	42	26	222	46
Red Fife	"	5⅓	42	3	231	16
White Fife	"	4⅔	37	35	178	31
Percy	"	5¼	32	53	172	38
Riga	"	¼	32	..	8	..
Early Riga	"	¾	31	50	23	52
Stanley	"	5¼	31	4	163	6
Pringle's Champlain	"	2	28	28	56	56
		44			1,762	5

An average of 40 bushels 3 lbs. per acre.

COMPARISON OF FIELD LOTS OF WHEAT FOR THE LAST FIVE YEARS.

Below will be found dates of seeding and ripening, number of days maturing, and yield of Red Fife and four of the early cross-bred wheats for 1905, and also the averages for the last five years. The five varieties have been grown each year in field lots, under the same conditions, except that the seeding could not in all cases be done on the same day.

Variety.	1905.					Average No. of days to mature.	Days less than Red Fife.	Average yield	
	Date sown.	Date ripe.	Days to mature.	Yield.					
				Bus.	Lbs.			Bus.	Lbs.
Red Fife	April 3..	Sept. 1..	151	42	3	135·6	.....	40	47
Preston (Red Fife × Ladoga)..	" 4..	Aug. 21..	139	46	54	125·4	10·2	39	32
Stanley " " ..	" 3..	" 22..	141	31	4	125·	10·6	36	17
Percy (White Fife × Ladoga)..	" 3..	" 22..	141	32	53	127·8	7·8	32	40
Huron " " ..	" 5..	" 23..	140	47	12	123·4	12·2	42	56

SPRING WHEAT—TEST OF FERTILIZERS.

Six plots of 1-40th acre each were sown with Red Fife wheat on May 2, with hoe drill, at the rate of 1½ bushels per acre. Soil clay loam.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Rusted.
			In.		In.	Lbs.	Bush.	Lbs.	
Plot No. 1—Nitrate of soda, 100 lbs. per acre (half sown when grain was 2 in. high, balance when 6 in. high).....	Sept. 4.	125	55	Medium	4	6,280	42	..	Considerably.
Plot No. 2—Nitrate of soda, 200 lbs. per acre (half sown when grain was 2 in. high, balance when 6 in. high).....	" 4.	125	48	" .	4	5,400	43	20	"
Plot No. 3—Superphosphate No. 1, 400 lbs. per acre (sown before grain and harrowed)	" 4.	125	52	" .	4¼	6,920	38	..	"
Plot No. 4—Check plot, unfertilized.....	" 4.	125	48	" .	4	7,240	42	40	"
Plot No. 5—Muriate of potash, 200 lbs. per acre (sown before grain and harrowed)...	" 3.	124	49	Weak...	4	4,760	47	20	"
Plot No. 6—Superphosphate No. 1, 200 lbs. per acre; muriate of potash, 100 lbs. per acre; nitrate of soda, 100 lbs. per acre (half sown before grain and harrowed, balance when the grain was 2 in. high)...	" 3.	124	54	" ...	4¼	5,840	42	40	"

MACARONI WHEAT—TEST OF VARIETIES.

Four varieties were sown April 6, in 1-20th acre plots on fallowed land, clay loam. All were badly lodged from heavy growth of straw.

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.	Rusted.
			In.		In.		Lbs.	Bush. Lbs.	Lbs.	
1 Goose	Aug. 28	144	53	Weak...	3¼	Bearded	10,440	54 40	64¾	Considerably on leaves.
2 Yellow Gharnovka	" 28	144	55	" ..	3	"	10,140	52 ..	64	"
3 Mahmoudi	" 28	144	54	" ..	3	"	8,360	51 20	63	"
4 Roumanian	" 26	142	54	" ..	3	"	8,000	45 40	63	"

EMMER AND SPELT.

Two varieties of spelt and two of emmer were sown April 8, by hoe drill on fallowed land, clay loam. Plots were 1-20th acre each. One acre of Common emmer, and two small plots of White spelt were also sown, the results being shown below:—

Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	Weight per Bushel.
			In.		In.		Lbs.	Lbs.	Lbs.
1 Red Spelt	Aug. 28	142	51	Medium	4½	Bald....	5,380	3,420	38
2 White Spelt	" 28	142	55	Strong..	6	" ...	4,260	3,340	34
3 Red Emmer	" 30	144	51	Weak...	4	Bearded	5,560	3,040	40½
4 Common Emmer	" 28	142	50	" ..	3½	"	4,460	2,940	48
Common Emmer	" 29	125	51	" ..	2¼	"	. ..	3,124	
White Spelt	" 29	122	50	Strong..	5½	Bald....	.....	2,435	
" "	" 28	121	60	" ..	6	"		2,344	

SUMMER FALLOWS.

In view of the great importance of properly preparing land for crops, and of the large number of new settlers coming into the country, I make no excuse for repeating what was said in my last three reports respecting summer-fallows, and breaking up and cultivating new prairie land.

It is very gratifying to know that throughout the Territories, summer-fallowing is rapidly becoming general. No matter where farming is carried on, the farmers realize that to be sure of a crop they must prepare a portion of their land the year before the crop is grown, and apart from the value of the stored moisture, there is the inestimable advantage of keeping weeds from overrunning the farm.

The true worth of properly prepared fallows has been clearly demonstrated in past years in every grain-growing district of Assiniboia.

The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the Territories, that perhaps a few words on some of the methods employed may be of help to at least some of the new settlers.

It has been observed in Alberta and Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full grown and in many cases, bearing fully matured seed. It is then ploughed.

By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia paniculata*), testify to the indifferent work done in many districts, and, while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or of fall or spring cultivation.

As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

First Method.—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

Result.—Too much late growth if season was at all wet; grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

Second Method.—Ploughed shallow (3 inches deep) before the last of June; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

Result.—Poor crop in a dry year; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

Third Method.—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

Fourth Method.—Ploughed deep (7 to 8 inches) before the last of June; surface cultivated during the growing season.

Result.—Sufficient moisture conserved for a dry year, and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing under weeds with their seeds ripe or nearly so, is adding a thousand-fold to the myriads already in the soil, and does not materially enrich the land.

METHODS OF PREPARING NEW GROUND.

In view of the fact that every year brings to the Territories many new settlers, who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this very important work may not be amiss.

In all sections where the sod is thick and tough, breaking and back-setting should be done; while in districts where scrub abounds and the sod is thin, deep breaking is all that is necessary.

The former is generally applicable to Assiniboia, and the latter to Alberta and Saskatchewan, especially to the northern parts of these Territories where the land is more or less scrubby.

SHALLOW-BREAKING AND BACK-SETTING.

The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14-inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit back-setting to commence early in August.

Back-setting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough, but three to four inches will give better results.

After back-setting, the soil cannot be made too fine, and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.

DEEP BREAKING.

Deep breaking, which in many sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where breaking and back-setting would give more satisfactory results, consists in the turning over of the sod as deeply as possible, usually from four to five inches.

When the sod has rotted, the top soil should be worked and made as fine as possible. The use of harrow and disc will fill up all irregularities on the surface, and make a fine, even seed-bed.

Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come during June or early in July. These rains cause the sod to rot, and without them, or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.

To some districts near the foot-hills of the mountains and in districts where scrub abounds and the sod is thin, these remarks may not apply; but as a rule, throughout the Territories, early breaking, whether deep or shallow, is advisable.

WORKING LAND AFTER FIRST CROP.

Inquiries are often made as to what should be done after taking off the first crop on new land, the question being as to whether the land should be ploughed, or cultivated, or sown without any cultivation whatever.

This, however, can only be determined by circumstances. In districts with heavy clay soil, a satisfactory crop may be expected from burning the stubble of the former crop and sowing with or without cultivation, although a shallow cultivation after the stubble is burnt usually gives the best results.

In districts with light soils and especially with gravelly subsoil, cultivation before seeding is necessary.

After taking the second crop from breaking or back-setting, there can be no doubt that the land should be well fallowed to put it in proper condition for succeeding crops. If the fallow is well made and the process repeated every third year, the settler will have started on the right road to future success.

SMUT.

Smut the past season has been bad in many sections of the country, causing serious loss to the growers. Several reasons may be given why smut was so prevalent, but without a doubt the chief one was improper treatment of the seed. That smut can be entirely prevented has been time and again proven. Care must be taken to dissolve the bluestone before applying, and to have the solution strong enough.

I repeat what was said in my last report in regard to treatment for prevention of smut.

On account of many new settlers coming into the country each year that can have no idea of the prevalence of smut, especially in the wheat crop, and the serious loss caused by this fungous disease, I submit the results obtained during the past years on this farm for their guidance.

Bunt or stinking smut in wheat is a fungous disease that attacks the grain more or less each year, and where at all bad, the crop is rendered unsaleable, and with only a few heads affected, if threshed in damp weather, the grade and price are reduced. No district is proof against smut, and though more prevalent in some seasons than others, it is wise to guard against all danger from this source each year. Two remedies have been tried repeatedly; these are, treating the seed with bluestone (Copper Sulphate), and with formalin. Bluestone, from cheapness, ease in application and effectual cure, has proven the best for wheat, while formalin has given the best results with smut in oats and barley. While formalin is not more expensive than bluestone, the application is more difficult in the seed having to be soaked longer.

For wheat apparently free from smut, 1 pound of bluestone crushed and dissolved in warm water and mixed with 10 gallons water, and the seed sprinkled with, or dipped in the solution, is sufficient for 10 bushels. For wheat at all affected, 1 pound bluestone to 5 bushels seed is required. The seed can be sprinkled or dipped as is most convenient, but, in sprinkling, care must be taken that every grain is wet with the solution.

For smut in oats or barley, 1 pound of formalin (which is a liquid), is sufficient for 50 bushels seed. If the seed is smutty the solution should be 8 or 9 ounces formalin to 10 gallons of water; if not smutty, 4½ ounces to the same quantity of water.

The seed should be soaked from 5 minutes to 2 hours, according to condition of grain and strength of solution.

EXPERIMENTS WITH OATS.

Forty-one varieties were sown on April 26, on 1-20th acre plots of fallowed land. Soil, clay loam. They were sown by hoe drill, at the rate of 2 bushels seed per acre.

All sorts were very heavy and badly lodged, and had to be cut with a mower; all, however, were well advanced when heavy rains and wind lodged them, and both yield and sample were good.

Oats—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Goldfinder	Aug. 26	122	53	Weak	9	Branching	6,200	117	22	39	Considerably on leaves.
2	Pioneer	" 28	124	59	"	11	"	6,160	112	32	40	
3	Siberian	" 24	120	62	Medium	12	Sided	7,200	111	26	39½	" "
4	Joanette	" 28	124	54	"	10	Branching	7,940	111	26	36½	" "
5	Golden Tartarian	" 26	122	52	Weak	10	Sided	7,020	111	6	38	" "
6	Twentieth Century	" 20	116	52	"	10	Branching	4,440	110	20	41	" "
7	Columbus	" 25	121	50	"	9	"	7,240	110	20	40	" "
8	Golden Beauty	" 26	122	51	"	10	"	7,240	110	20	41	" "
9	American Triumph	" 23	119	50	"	9	"	6,260	110	..	41	" "
10	Tartar King	" 23	119	50	"	9	Sided	5,660	110	..	42	" "
11	Early Golden Prolific	" 26	122	54	"	11	Branching	7,280	109	14	41	" "
12	Kendal White	" 23	119	56	"	9	"	7,300	108	28	41½	" "
13	Scotch Potato	" 23	119	54	Medium	10	"	7,160	107	2	40	" "
14	Mennonite	" 20	116	50	Weak	9	"	6,380	106	16	39½	" "
15	Improved American	" 24	120	52	"	9	"	6,220	105	10	42½	" "
16	White Giant	" 22	118	54	Medium	9	"	5,840	104	24	42	" "
17	Golden Giant	" 28	124	56	"	10	Sided	7,840	104	24	37	" "
18	Danish Island	" 20	116	55	Weak	10	Branching	5,840	104	24	42½	" "
19	Lincoln	" 24	120	54	"	10	"	5,920	102	12	41½	" "
20	Milford White	" 24	120	52	"	10	Sided	8,120	102	12	41½	" "
21	Holstein Prolific	" 21	117	50	Medium	10	Branching	6,740	101	26	40½	" "
22	Golden Fleece	" 27	123	50	Weak	9	"	8,140	101	6	40	" "
23	Waverley	" 22	118	52	"	10	"	6,960	101	6	42	" "
24	American Beauty	" 24	120	50	"	8	"	7,160	101	6	40	" "
25	Buckbee's Illinois	" 20	116	54	"	9	"	6,960	101	6	41	" "
26	Improved Ligowo	" 20	116	57	"	9	"	5,360	101	6	42	" "
27	Bavarian	" 21	117	57	"	8	"	7,400	100	..	38½	" "
28	Storm King	" 22	118	53	"	11	Sided	5,820	99	14	38	" "
29	Wide Awake	" 20	116	54	Medium	8	Branching	5,620	99	14	39½	" "
30	Irish Victor	" 24	120	56	Weak	10	"	6,860	98	8	42¼	" "
31	Abundance	" 21	117	53	Medium	9	"	5,440	95	30	40	" "
32	Banner	" 20	116	55	Weak	10	"	5,960	95	10	40	" "
33	Swedish Select	" 20	116	54	"	9	"	5,980	94	24	40½	" "
34	Olive Black	" 28	124	57	Medium	12	Sided	8,460	92	12	36¼	" "
35	Kirsche	" 26	122	52	"	9	Branching	7,740	90	..	39½	" "
36	Baxter's July	" 8	104	60	Weak	10	"	7,540	90	..	40	Slightly on leaves.
37	Kendal Black	" 28	124	57	Medium	10	Sided	6,560	89	14	40	Considerably on leaves.
38	Milford Black	" 28	124	55	"	10	"	7,320	84	24	37	
39	Sensation	" 20	116	53	Weak	10	"	6,400	82	12	41	" "
40	Black Beauty	" 28	124	56	"	13	Branching	5,660	74	24	36	" "
41	Thousand Dollar	" 19	115	54	Medium	11	"	5,900	73	18	41½	" "

The Baxter's July oat was received in the spring of 1905, from B. J. Baxter, Pense, Sask., under that name. This sort was cut on August 8, while the earliest other variety was cut August 20. The straw was very weak, but in ordinary years it may be much stiffer. The yield was 90 bushels per acre, and on account of earliness this variety is worthy of further trial.

EXPERIMENTS WITH OATS IN FIELD LOTS.

Twelve varieties were sown April 24 to 28, in field lots, on clay loam, and all gave good yields and good samples. Banner again heads the list for the best yield. All the varieties were more or less down, but there was no rust worth mentioning.

Oats—Test of Varieties in Field Lots.

Name of Variety.	Size of Plot.	Date of Ripening.	No. of Days Maturing.	Length of Straw including Head.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.
	Acres.			Inches.		In.		Bush.	Lbs.	Lbs.
Banner	10	Aug. 20	118	60	Medium	10	Branching	107	13	41
Danish Island	5	" 19	113	56	Strong	10	"	99	20	42½
White Giant	5	" 19	116	51	"	10	"	98	6	41½
Goldfinder	3	" 18	114	58	Weak	10	"	94	30	38
Improved Ligowo	5	" 19	116	55	Medium	10	"	90	28	41
Abundance	5	" 27	124	50	Strong	9	"	89	..	40
Wide Awake	5	" 18	115	55	"	10	"	89	..	43½
Thousand Dollar	2¾	" 18	112	52	Medium	9	"	89	..	41
Waverley	2¾	" 18	112	54	Strong	9	"	87	23	42½
Welcome	4	" 18	115	52	Weak	9	"	86	..	39
Tartar King	3½	" 18	114	60	Medium	9	Sided	84	28	41
Black Beauty	3	" 18	114	54	Weak	10	Branching	84	..	38½

Oat Crop and Average Yield.

Variety.	Cultivation.	Acres..	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Banner	Fallow	10	107	13	1,073	23
Danish Island	"	5	99	20	497	32
White Giant	"	5	98	6	490	30
Goldfinder	"	3	94	30	284	22
Improved Ligowo	"	5	90	28	454	4
Abundance	"	5	89	..	445	..
Wide Awake	"	5	89	..	445	..
Thousand Dollar	"	2¾	89	..	244	25
Waverley	"	2¾	87	23	241	4
Welcome	"	4	86	..	344	..
Tartar King	"	3½	84	28	296	30
Black Beauty	"	3	84	..	252	..
		54			5,070	5

An average of 93 bushels 30 lbs. per acre.

FIELD LOTS OF OATS.

COMPARISON OF NINE VARIETIES FOR FIVE YEARS.

Following are given the average number of days maturing and average yield for the last five years of nine varieties of oats, grown in field lots under similar conditions. They were sown each year on fallowed land.

Variety.	Average time maturing for 5 years.	Average yield for 5 years.	
	Days.	Bush.	Lbs.
Banner	111·2	103	7
Abundance	114·	95	12
Wide Awake	111·4	91	..
Goldfinder	115·6	90	19
Black Beauty	112·6	88	4
Tartar King	109·6	86	5
Waverley	112·	83	5
Thousand Dollar	111·8	82	2
Improved Ligowo	112·2	82	2

EXPERIMENTS WITH BARLEY.

Fifteen varieties of two-rowed and 19 of six-rowed barley were sown on one-twentieth acre plots clay loam on April 27 to 29, with hoe drill, at the rate of two bushels of seed per acre. All gave good returns, with bright, plump samples. Some plots had to be cut with the mower, and all were badly lodged.

BARLEY TWO-ROWED—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.	Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush. Lbs.	Lbs.
1	Beaver	Aug. 14..	107	46	Medium	4	4,660	75 ..	53½
2	Invincible	" 17 .	110	46	"	3	5,820	74 28	54
3	Gordon	" 13..	108	51	"	3	3,300	64 28	52½
4	Standwell	" 18..	111	48	"	2½	6,220	62 4	53½
5	Swedish Chevalier	" 18..	111	43	"	3½	5,340	59 28	54
6	Newton	" 19..	112	49	"	3	5,660	57 4	53¼
7	Danish Chevalier	" 18..	111	40	"	3¼	6,140	55 20	52½
8	Canadian Thorpe	" 13..	106	48	Weak	3	5,160	55 ..	52½
9	Clifford	" 14..	107	48	"	4	4,520	51 32	53
10	Sidney	" 14..	109	47	"	4	4,340	51 12	54
11	French Chevalier	" 15..	108	44	"	3¼	4,000	50 20	53
12	Jarvis	" 14..	109	50	Medium	4	4,000	50 ..	53
13	Logan	" 14..	109	48	Weak	3½	3,700	47 44	52½
14	Harvey	" 13..	106	46	Medium	3¼	3,920	47 24	53
15	Dunham	" 14..	107	50	Weak	3	4,000	41 32	54

BARLEY SIX-ROWED—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw including head.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Stella	Aug. 15..	108	43	Medium	2	4,220	82	44	53½
2	Nugent	" 15..	108	45	"	3	5,020	78	36	51
3	Claude	" 14..	107	45	"	2½	4,640	74	8	50½
4	Blue Longhead	" 15..	108	43	"	2½	3,860	73	36	47
5	Yale	" 16..	109	43	"	2½	3,880	73	16	51
6	Mansfield	" 12..	105	46	"	2	6,040	70	..	53
7	Mensury	" 12..	105	50	Strong	3	7,080	69	8	52
8	Common	" 11..	104	42	Weak	2	5,660	65	20	54
9	Rennie's Improved	" 10..	103	43	Medium	2½	6,360	63	16	54
10	Summit	" 14..	107	49	Strong	2½	6,780	62	44	52
11	Trooper	" 13 .	106	47	Weak	3	6,000	62	24	52½
12	Empire	" 14..	107	44	Medium	2¾	6,400	62	24	52½
13	Oderbruch	" 10..	103	44	Weak	2½	6,200	62	24	54½
14	Odessa	" 16..	109	44	Medium	2¼	6,420	62	4	52½
15	Argyle	" 12..	105	49	"	2¼	7,020	62	4	53
16	Brome	" 16..	109	45	Weak	3	7,060	61	12	51½
17	Royal	" 10..	103	45	"	2¼	6,080	60	40	53
18	Albert	" 14..	107	45	Medium	2¾	5,840	57	24	54½
19	Champion	" 7..	100	43	Weak	2¾	5,260	36	12	48

FIELD LOTS OF BARLEY.

Nine varieties of barley were sown in field lots. Nearly all the yields were above the average, and all the varieties gave a good sample. Mensury was sown on Brome Grass sod, broken and back-set the previous year, and Canadian Thorpe was put in on land which gave a root crop in 1904. Sidney was sown on fallow, and also on Brome sod. The other kinds were all on fallow. All were sown on clay loam.

BARLEY—TEST OF VARIETIES IN FIELD LOTS.

Name of Variety.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw, including head	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.		Weight per measured bushel after cleaning.
	Acres				In.		In.		Bush.	Lbs.	Lbs.
Odessa	3	April 29	Aug. 13	106	55	Weak	3	Six-rowed	73	34	51
Claude	3½	" 27	" 13	108	48	Medium	3	"	72	22	49
Mansfield	5	" 26	" 12	108	50	Strong	2½	"	70	45	51½
Standwell	4	May 1	" 24	115	50	Weak	3½	Two-rowed	64	40	52
Mensury	5	" 1	" 12	103	52	Strong	3¼	Six-rowed	62	18	50½
Royal	1¾	April 29	" 11	104	47	Weak	3	"	59	42	52
Invincible	3½	May 1	" 24	115	48	Medium	3½	Two-rowed	57	6	53¼
Sidney	2¼	" 1	" 17	108	45	"	4¼	"	56	15	53½
Canadian Thorpe	5	" 2	" 17	107	48	Strong	3	"	54	18	53
Sidney	2	" 1	" 17	108	43	"	4	"	46	2	53½



Banner Oats in Stook, Experimental Farm, Indian Head, Sask.

Photo. by C. E. Saunders.

BARLEY CROP AND AVERAGE YIELD.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Odessa	Fallow	3	73	34	221	6
Claude	"	3½	72	22	253	29
Mansfield	"	5	70	45	354	33
Standwell	"	4	64	40	259	16
Mensury	Brome-sod	5	62	18	311	42
Royal	Fallow	1¾	59	42	122	14
Invincible	"	3½	57	6	203	42
Sidney	"	2¼	56	15	126	34
Canadian Thorpe	Root land	5	54	18	271	42
Sidney	Brome-sod	2	46	2	92	4
		35			2,217	22

An average of 63 bushels 17 lbs. per acre.

FIELD LOTS OF BARLEY.

COMPARISON OF NINE VARIETIES FOR FIVE YEARS.

Following will be found the average number of days maturing and average yield for the past five years of nine varieties of barley. These were grown for the most part in field lots on fallow, but in one or two cases, where the varieties were not grown under these conditions, the yields of the uniform tests were taken, or yields of field plots grown on stubble or sod, in order to get figures for the five years.

Variety.	Average time maturing for five years	Average yield for five years.	
	Days.	Bush.	Lbs.
Claude	104·2	64	46
Royal	100·2	60	17
Odessa	100·	59	43
Mensury	99·	58	29
Mansfield	103·8	58	25
Invincible	110·	57	..
Sidney	104·2	56	8
Standwell	107·8	59	21
Canadian Thorpe	105·6	50	..

EXPERIMENTS WITH PEASE.

Thirty varieties of field pease were sown on one-twentieth acre plots, on May 2 on corn land ploughed in fall of 1904. Two bushels of small, 2½ bushels of medium and 3 bushels of large pease were sown to the acre. Soil, clay loam.

All sorts made a fine growth of straw, were well podded and ripened early.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
				In.	In.		Bush.	Lbs.	Lbs.
1	Kent	Aug. 28	118	67	2¼	Medium	70	..	63¼
2	Paragon	" 31	121	58	3	"	69	40	65
3	Chancellor	" 29	119	79	3	Small	69	20	65
4	Golden Vine	Sept. 1	122	68	2½	"	67	40	64
5	Mackay	" 1	122	55	3	Large	65	40	65
6	Pride	" 1	122	70	2	Small	64	40	64
7	Gregory	Aug. 31	121	67	3	Medium	62	..	64
8	Agnes	" 30	120	85	3	Large	61	40	63
9	Duke	" 31	121	60	3	Medium	59	40	64
10	English Grey	" 31	121	74	3¼	Large	58	20	62½
11	Victoria	" 30	120	61	3¼	Medium	58	..	64
12	Carleton	Sept. 1	122	62	3	"	58	..	64
13	White Wonder	Aug. 29	119	65	3	Large	57	40	65
14	Nelson	" 29	119	52	3	Medium	57	40	64½
15	Dan O'Rourke	" 31	121	68	2	Small	57	..	65½
16	Black Eye Marrowfat	Sept. 1	122	56	3	Large	57	..	64
17	Prince Albert	Aug. 31	121	88	2¾	Small	56	40	65
18	Archer	" 2	123	73	2¾	Medium	56	20	64
19	Macoun	" 30	120	70	3¼	"	56	20	64½
20	Picton	" 28	118	68	2¾	"	56	..	64½
21	Early Britain	" 31	121	65	2¾	Small	55	40	63½
22	Crown	" 30	120	73	2½	"	54	20	64½
23	Prussian Blue	" 30	120	56	3	Medium	53	..	64½
24	Pearl	" 1	122	70	2¾	"	52	..	63½
25	White Marrowfat	" 2	123	75	3	Large	51	..	65
26	Mummy	" 30	120	60	3	Small	51	..	65
27	Prince	" 29	119	60	3	"	48	40	64
28	Wisconsin Blue	" 2	123	57	2¾	"	47	40	65
29	Arthur	" 28	118	75	2½	Large	45	40	64½
30	German White	" 30	120	60	3	Medium	42	40	64½

GARDEN PEASE.

A test was made with sowing garden pease with grain drill alongside of the field varieties. The returns received were quite satisfactory, and show that a profitable crop can be grown. Plots were one-twentieth acre each.

PEASE—TEST OF VARIETIES.

Number.	Variety.	Yield per Acre.		Weight per measured Bushel.
		Bush.	Lbs.	Lbs.
1	Alaska	50	20	65
2	Shropshire Hero	49	10	59¾
3	Premium Gem	45	20	59¾
4	Horsford's Market Garden	44	40	59
5	Stratagem	43	40	59
6	Laxton's Charmer	43	..	58
7	Champion of England	40	..	59
8	American Wonder	39	20	60

FIELD LOTS OF PEASE.

Five varieties of pease were sown on May 3 and 4 in large plots—from 2½ acres to one-sixth acre. The soil was clay loam. They were pulled by a pea harvester attached to an ordinary mower, and were threshed by threshing machine, with entire concave removed. A considerable proportion were split in the operation.

PEASE—FIELD LOTS.

Number.	Name of Variety.	Size of Plot.	Date of Ripening.	Number of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
		Acres.				In.	In.		Bush. Lbs.	Lbs.
1	Dan. O'Rourke	1/3	Aug. 28	116	Strong	62	2¼	Medium	53 24	65
2	White Wonder.	1/3	" 28	116	"	80	3	Large	49 50	64
3	Golden Vine	1/3	" 29	118	"	63	2⅜	Small	49 ..	65¼
4	Arthur	2½	" 24	113	"	61	2⅛	Large	47 50	65
5	German White	1/6	" 29	117	"	65	2⅜	Medium	35 33	63

ROTATION CROPS.

The rotation tests commenced in 1899 were continued this year. Several of the half acres of grain on fallowed land were rusted. The soil was a clay loam.

Below is given a list of the plots with the different rotations of crops grown on them:—

No.	1899 and 1902.	1900 and 1903.	1901 and 1904.	1905.
1	Wheat	Oats	Soja Beans	Wheat.
2	"	Wheat	Pease	"
3	"	Oats	Tares	"
4	"	Wheat	Red Clover	"
5	"	Barley	Alsike and Alfalfa	"
6	Pease	Wheat	Wheat	Pease.
7	Tares	"	Oats	Tares.
8	Soja Beans	"	"	Soja Beans.
9	Red Clover	"	Wheat	Red Clover.
10	Alsike and Alfalfa	"	Barley	Alsike and Alfalfa.
11	Rape	"	Summer fallow	Timothy.
12	Wheat	"	"	Wheat.
13	"	Oats	"	"
14	"	Barley	"	"
15	"	Wheat	Oats	"
16	"	Barley	"	"
17	Oats	Soja Beans	Wheat	Oats.
18	Wheat	Pease	"	Wheat.
19	Oats	Tares	"	Oats.
20	Wheat	Red Clover	"	Wheat.
21	Barley	Alsike and Alfalfa	"	Barley.
22	Rye	Summer fallow	"	Common Emmer.

Rotation test.—Results obtained in 1905. Plots ½ acre each. Soil, clay loam.

GRAIN—ROTATION TEST.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Yield per Acre.	
					In.		In.		Bush.	Lbs.
1	Wheat, Red Fife.	April. 5..	Aug. 27..	144	52	Medium..	4	Bald.....	33	20
2	" "	" 5..	" 27..	144	56	Strong ...	4	"	27	48
3	" "	" 5..	" 27..	144	54	"	3¾	"	31	24
4	" "	" 5..	– 27..	144	51	"	4	"	28	32
5	" "	" 5..	" 27..	144	51	"	3¾	"	28	54
6	Pease	May 3..			Ploughed under.					
7	Tares.....	" 3..			"	"				
8	Soja Beans	" 17..			"	"				
9	Red Clover.....	" 18..			"	"				
10	Alsike and Lucerne...	" 18..			"	"				
11	Timothy	.....			"	"				
12	Wheat, Red Fife.....	April 5..	Aug. 27..	144	52	Medium..	4	Bald.....	34	10
13	" "	" 5..	" 27..	144	53	Strong ...	3¾	"	38	52
14	" "	" 5..	" 27..	144	52	"	4	"	32	54
15	" "	" 5..	" 27..	141	51	"	4	"	32	46
16	" "	" 5..	" 27..	144	49	"	3¼	"	18	24
17	Oats, Banner..	" 26..	" 22..	118	48	"	9	Branching	42	12
18	Wheat, Red Fife.....	" 5..	" 26..	143	47	"	3	Bald	18	26
19	Oats, Banner	" 26..	" 22..	118	50	"	9	Branching	52	18
20	Wheat, Red Fife.....	" 5..	" 26..	143	50	"	3	Bald . . .	23	28
21	Barley, Mensury.....	May 2..	" 9..	99	48	"	3½	6-rowed ..	43	28
22	Common Emmer.....	" 2..	" 26..	116	48	"	3	Bearded..		1866

EXPERIMENT WITH FALL RYE.

One-quarter acre of fallowed land was sown with fall rye on September 10, 1904. Ripe August 3. Straw was medium strength, 77 inches long. Length of head, 4½ inches. Yield per acre, 40 bushels; weight per bushel, 58½ lbs. It gave a large crop of straw as well as of grain, and is well worth growing for early fodder or for grain.

EXPERIMENT WITH SPRING RYE.

Sown on one-twentieth acre plot of fallowed land, April 8. Ripe August 12; time to mature, 126 days. Straw medium; 60 inches long; weight of straw per acre, 3,000 lbs. Length of head, 3¼ inches. Yield per acre, 53 bushels, 32 lbs. Weight per measured bushel, 59 lbs. Straw was light in comparison with the winter variety, though the yield of grain was heavier.

EXPERIMENT WITH TARES.

Sown on one-twentieth acre plot of fallowed land, May 2. Ripe September 5; time to mature, 126 days. Length of straw, 50 inches; pod, 2 inches; weight of straw per acre, 3,800 lbs. Yield per acre, 59 bushels, 15 lbs., weighing 64½ lbs. per measured bushel.

EXPERIMENT WITH CANARY GRASS.

(Phalaris canariensis).

One-twentieth acre of fallowed land was sown with Canary Grass seed on May 2. Ripe August 28; time to mature, 118 days. Straw strong; length, 44 inches; heads, 1½ inches long. Weight of straw per acre, 2,340 lbs. Yield per acre, 20 bushels, 40 lbs. Standard weight of bushel, 48 lbs. Weight per measured bushel, 58 lbs.

EXPERIMENT WITH SOJA BEANS.

Sown May 17, in rows 28 inches apart, on one-twentieth acre plot of fallowed land. They were in flower when killed by frost on October 1. Yield per acre of dry fodder, 2 tons, 400 lbs. Cut, October 9.

EXPERIMENT WITH HORSE BEANS.

Sown May 17, in rows 28 inches apart, on one-twentieth acre plots of fallowed land. Height when cut on October 9, 48 inches. Weight of dry fodder per acre, 3½ tons.

EXPERIMENT WITH MILLETS.

Five varieties were sown on May 16 and 17 on one-fortieth acre plots of fallowed land. Three varieties germinated very poorly and were ploughed up. The other two plots were cut on September 12, partially ripe.

Variety.	Date Sown.	Height when Cut.	Yield per Acre Dry Fodder.	
		Inches.	Tons.	Lbs.
Moha Hungarian	May 17	38	3	92
Moha Green Californian	" 17	36	2	1,238
Cat Tail	" 16	Plowed up.	..	..
White Round French	" 16	"	..	..
Italian	" 16	"	..	..

EXPERIMENTS WITH FLAX.

Five varieties of flax were sown on one-fortieth acre plots of land, which had produced a corn crop the previous year. Sown May 16, by grain drill, at the rate of 40 lbs. per acre.

Common flax was sown on the same date at the rate of 20, 30, 40 and 50 lbs. seed per acre, one-twentieth acre of each being put in. Sown on corn land, same as the preceding test.

Common flax was sown on fallowed land on May 15, on a plot 1¼ acres in extent.

Details of these tests are given below. The soil in all cases was a clay loam.

FLAX—TEST OF SOWING DIFFERENT QUANTITIES OF SEED PER ACRE.

Quantity of Seed per Acre.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
	Ac.				In.		Lbs.	Bush.	Lbs.	Lbs.
20 lbs	$\frac{1}{20}$	May 16..	Aug. 17..	93	32	Strong ...	1,500	14	16	.....
30 "	$\frac{1}{20}$	" 16..	" 17..	93	33	" ...	2,080	20	40	.....
40 "	$\frac{1}{20}$	" 16..	" 17..	93	34	" ...	1,840	18	32	.....
50 "	$\frac{1}{20}$	" 16..	" 17..	93	30	" ...	2,260	21	44	.....

FLAX—TEST OF VARIETIES.

Yellow Seeded	$\frac{1}{40}$	May 16..	Aug. 20..	96	30	Strong ...	2,500	24	..	54½
Riga	$\frac{1}{40}$	" 16..	" 17..	93	33	" ..	1,840	22	48	54½
Common	$\frac{1}{40}$	" 16..	" 17..	93	35	" ...	2,000	17	8	55½
White Flowering	$\frac{1}{40}$	" 16..	" 20..	96	26	" ...	1,780	16	24	54½
Improved Russian	$\frac{1}{40}$	" 16..	" 17..	93	32	" ...	1,720	15	40	53½
Common Flax	1¼	" 15..	" 17..	94	36	" ...	.....	13	24	.....

HAY CROP.

While a good yield of hay was obtained from Brome and Western Rye grass the past season, it was not so heavy as in former years, from the fact that all the fields have been in hay for several years. The various sorts of Alfalfa came through the winter quite safely, and gave good yields. Red clover was half killed, the balance being left to ripen and cut for seed. Considerable Alfalfa was also cut for seed.

Meadow Fescue, sown in 1904, gave a fair return.

Kentucky Blue grass, and Orchard grass (two-thirds of which was a mixture of other sorts), gave good crops.

Alsike sown in 1904, did not stand the winter.

From the past season's tests, favourable hopes are entertained that many varieties of grasses that were all failures in the early years of the farm may yet prove successful in the future.

In May last, the Agricultural Department at Washington sent to this farm alfalfa seed for sowing, which had been obtained from the following places: Utah, Northern Montana, Southern Montana, Peru, Nebraska, New York, Turkestan, Minnesota (Grimm), and some first quality commerical seed. These were all sown in plots varying in size according to quantity of seed of each sort received. They all germinated, and made a vigorous growth during the season.

Seed of Red clover and Alfalfa, both inoculated and untreated, were sent up from the Central Experimenal Farm, Ottawa, for trial. These made a vigorous growth, and except going over them with a mower, they were not cut. The inoculated alfalfa showed a somewhat stronger growth than the untreated seed, but the two clover plots were almost equally good.

YIELDS OF HAY PER ACRE.

Brome Grass—(Bromus inermis).

Size of Plot. — Acres.	—	Yield per Acre.	
		Tons.	Lbs.
½	Sown 1899, renewed by ploughing shallow, 1904	1	1,500
4½	" 1900	..	1,440
12	" 1901	1	1,110
2¼	" 1899	..	1,762
5½	" 1900	..	1,430

Western Rye Grass—(Agropyrum tenerum).

2	Sown 1902	1	632
2	" 1901	2	1,000
⅔	" 1904	3	....

Small Plots of Clover and Grasses.

—	Sown.	Yield per Acre.			
		1st Cutting.		2nd Cutting.	
		Tons.	Lbs.	Tons.	Lbs.
Common Alfalfa	1904..	2	222	1	900
Turkestan Alfalfa	1904..	2	1,480	1	1,360
Utah Alfalfa	1904..	2	1,000	1	1,080
Meadow Fescue	1904..	1	1,000	..	....
Timothy	1902..	..	940	..	....
Orchard Grass	1904..	1	700	..	....
Kentucky Blue Grass	1904..	2	555	..	....

EXPERIMENTS WITH INDIAN CORN.

Twenty-two varieties were sown on May 19, on clay loam in drills 36 inches apart, and also in hills 3 feet apart each way. Three varieties were also sown in drills at four different distances apart.

The land was fallowed the previous year, but not manured.

The corn was cut on September 8, the yield per acre of green fodder being calculated from the weight of two rows, each 66 feet long. All the varieties made a strong growth.

After wilting slightly, the corn was cut up and put in silo. In addition to the uniform tests, five acres were sown with corn for ensilage.

INDIAN CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Height.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
		In.		Tons.	Lbs.	Tons.	Lbs.
1	Eureka	92	Tasselled	19	1,600	15	1,900
2	Superior Fodder	84	Not tasselled	19	1,600	12	750
3	Pride of the North	90	In silk	19	500	16	1,000
4	Red Cob Ensilage	90	Not tasselled	18	850	11	550
5	Selected Leaming	86	Tasselled	18	300	12	750
6	Thoroughbred White Flint	67	Not tasselled	17	650	14	600
7	Compton's Early	80	In silk	17	650	9	150
8	Salzer's All Gold	84	Not tasselled	16	1,550	15	1,350
9	Northern Dent	90	Tasselled	16	450	12	1,300
10	North Dakota White	60	In silk	15	1,350	11	1,100
11	White Cap Yellow Dent	90	Tasselled	14	600	12	200
12	Mammoth Cuban	90	In silk	14	600	10	350
13	Champion White Pearl	92	Tasselled	14	50	12	1,300
14	Giant Prolific Ensilage	83	"	14	50	11	1,650
15	Longfellow	78	In silk	13	1,500	12	200
16	Angel of Midnight	80	"	13	950	14	50
17	King Philip	80	"	13	400	13	1,500
18	Early Mastodon	84	Early milk	13	400	11	1,650
19	Evergreen Sugar	80	In silk	12	1,850	10	900
20	Early Butler	90	Early milk	11	1,100	12	1,300
21	Cloud's Early Yellow	85	Tasselled	11	..	12	1,300
22	Compton's Early	80	Early milk	11	..	11	1,650

TEST OF SEEDING AT DIFFERENT DISTANCES.

Sown in rows by grain seeder May 19; cut September 9; all made strong growth. Cultivation of land same as for preceding test.

Name of Variety.	Distance between rows.	Height.	Weight per acre grown in rows.	
	Inches.	Inches.	Tons.	Lbs.
Longfellow	21	80	21	1,378
"	28	78	17	1,425
"	35	80	15	1,696
"	42	82	13	1,818
Selected Leaming	21	92	18	1,720
"	28	90	15	465
"	35	90	15	564
"	42	88	13	875
Champion White Pearl	21	94	13	604
"	28	96	14	340
"	35	96	13	1,168
"	42	100	13	404

ROOT CROPS.

The root crops this year of all sorts have never been surpassed since the Farm was started, yield and quality being considered. Turnips, mangels, carrots and sugar beets were all extra good.

All root seeds, including carrots, were sown with ordinary grain hoe-drill, which proved satisfactory, saving considerable labour in making drills. The yields were computed from the weight of two rows, 66 feet long and 30 inches apart.

EXPERIMENTS WITH TURNIPS.

Twenty varieties were sown, the soil was a clay loam; the first sowing was on May 17, and the second sowing on the 26th. They were all pulled on October 23.

Turnips—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Plot.				Yield per Acre. 2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Halewood's Bronze Top	38	1,484	1,291	24	24	1,368	822	48
2	Carter's Elephant	34	1,168	1,152	48	23	728	778	48
3	Sutton's Champion	33	1,980	1,133	..	24	1,764	829	24
4	Hall's Westbury	32	1,868	1,097	48	34	376	1,139	36
5	Good Luck	31	1,228	1,053	48	30	324	1,005	24
6	Perfection	31	436	1,040	36	36	204	1,203	24
7	Skirving's	30	1,776	1,029	36	28	1,420	957	..
8	Emperor	30	720	1,012	..	28	628	943	48
9	Bangholm Selected	29	1,664	994	24	33	792	1,113	12
10	Magnum Bonum	29	1,400	990	..	20	128	668	48
11	Imperial	28	1,288	954	48	29	1,400	990	..
12	Kangaroo	27	1,836	930	36	26	668	877	48
13	Jumbo	26	1,196	886	36	27	1,836	930	36
14	Selected Purple Top	25	1,876	864	36	25	1,480	858	..
15	New Century	25	826	847	..	29	1,400	990	..
16	East Lothian	23	860	781	..	22	616	743	36
17	Elephant's Master	22	1,804	763	24	28	1,816	963	36
18	Drummond Purple Top	22	748	745	48	24	840	814	..
19	Hartley's Bronze	21	1,956	732	36	29	476	974	36
20	Mammoth Clyde	21	240	704	..	27	1,044	917	24

Mangels—Test of Varieties.

Sixteen varieties were sown on clay loam. The first sowing was on May 13, and the second on May 26, and both were taken up October 9.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Prizewinner Yellow Globe	40	124	1,335	24	25	28	833	48
2	Triumph Yellow Globe	37	1,240	1,254	..	29	476	974	36
3	Yellow Globe Selected	34	1,960	1,166	..	29	80	968	..
4	Mammoth Yellow Intermediate	34	1,828	1,163	48	24	312	805	12
5	Giant Yellow Intermediate	34	244	1,137	24	27	1,704	928	24
6	Half Sugar White	33	1,980	1,133	..	29	1,796	996	36
7	Yellow Intermediate	33	1,452	1,124	12	25	556	842	36
8	Lion Yellow Intermediate	33	396	1,106	36	28	1,420	957	..
9	Giant Sugar	32	284	1,071	24	27	252	904	12
10	Giant Yellow Globe	31	964	1,049	24	30	1,644	1,027	24
11	Prize Mammoth Long Red	29	1,004	983	24	23	596	776	36
12	Mammoth Long Red	28	1,156	952	36	29	608	976	48
13	Half Sugar Rosy	28	628	943	48	23	992	783	12
14	Selected Mammoth Long Red	27	120	902	..	22	1,936	765	36
15	Leviathan Long Red	26	404	873	24	23	1,916	798	36
16	Gate Post	25	1,348	855	48	22	220	737	..

Carrots—Test of Varieties.

Eleven varieties were sown on clay loam on April 19; and were pulled on October 23.

Number.	Name of Variety.	Yield per Acre.		Yield per Acre.	
		Tons.	Lbs.	Bush.	Lbs.
1	Ontario Champion	25	1,744	862	24
2	New White Intermediate	24	1,368	822	48
3	Giant White Vosges	21	1,296	721	36
4	Carter's Orange Giant	20	1,448	690	48
5	White Belgian	18	36	600	36
6	Early Gem	17	1,904	598	24
7	Mammoth White Intermediate	17	584	576	24
8	Kos Kirsche	16	1,792	563	12
9	Improved Short White	16	1,264	554	24
10	Half Long Chantenay	13	1,984	466	24
11	Long Yellow Stump-rooted	10	1,648	360	48

Sugar Beets—Test of Varieties.

Eight varieties of sugar beets were sown on clay loam. The first sowing was made on May 13, the second on May 26 and both lots were taken up on October 21.

Number.	Name of Variety.	Yield per Acre. — 1st Plot.		Yield per Acre. — 1st Plot.		Yield per Acre. — 2nd Plot.		Yield per Acre. — 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Red Top Sugar	27	384	906	24	21	1,296	721	36
2	Royal Giant	27	252	904	12	23	1,368	800	48
3	Danish Improved	22	616	743	36	18	564	609	24
4	Improved Imperial	19	1,600	660	..	22	880	748	..
5	Vilmorin's Improved	16	1,396	556	36	16	228	503	48
6	Wanzleben	15	1,416	523	36	13	928	448	48
7	French Very Rich	15	888	514	48	15	1,812	530	12
8	Danish Red Top	12	1,872	431	12	24	840	814	..

EXPERIMENTS WITH POTATOES.

Forty-one varieties were under test at Indian Head in 1905. The soil was a clay loam summer-fallowed. The potatoes were planted on May 13, the sets being dropped in drills 30 inches apart. They were dug on October 3. There was no rot in any of the varieties; the yield and quality were excellent, and nearly all the tubers were marketable. While as large yields of potatoes have been grown in former years, the quality was not equal to those of this year's growth. The yield per acre has been obtained by weighing the potatoes from one row 132 feet long.

POTATOES—TEST OF VARIETIES.

	Name of Variety.	Average Size.	Total Yield per Acre. Bush.	Lbs.	Form and Colour.
1	Seedling No. 7	Large	640	48	Oval, red.
2	Vermont Gold Coin	Medium	625	24	Oval, white.
3	Rochester Rose	Large	561	36	Long, red.
4	Reeve's Rose	Medium	530	48	Oval, red.
5	Carman No. 3	Large	525	12	Oval, white.
6	Late Puritan	Medium	519	48	Oval, white.
7	American Giant	Large	511	..	Long, white.
8	Uncle Sam	"	508	48	Oval, white.
9	Sabean's Elephant	"	491	12	Long, white.
10	Early St. George	Medium.	491	12	Long, red.
11	Morgan's Seedling	Large	486	48	Oval, red.
12	Burnaby Mammoth	"	484	36	Long, red.
13	Maule's Thoro'bred	Medium	484	36	Oval, pink.
14	Dreer's Standard	"	475	48	Oval, white.
15	Rose No. 9	Large	473	36	Long, red.
16	Vick's Extra Early	Medium	462	36	Oval, pink.
17	Cambridge Russet	Large	460	24	Long, russet.
18	Country Gentleman	"	458	12	Oval, red.
19	Early Envoy	"	458	12	Oval, pink.
20	American Wonder	Medium	458	12	Long, white.
21	Penn Manor	Large	453	48	Long, red.
22	Money Maker	"	451	36	Oval, white.
23	Delaware	Medium	449	24	Oval, white.
24	Empire State	Large	447	12	Oval, white.
25	I. X. L.	Medium	442	48	Long, pink.
26	Carman No. 1	"	442	48	Oval, white.
27	Everett	Large	434	..	Long, pink.
28	State of Maine	"	418	36	Oval, white.
29	Pearce	"	398	48	Long, pink.
30	Early White Prize	Small	394	24	Oval, white.
31	Holborn Abundance	Large	392	12	Oval, white.
32	Early Andes	Small.	392	12	Round, pink.
33	Enormous	Large	379	..	Long, white.
34	Early Elkinah	Small	365	48	Round, red.
35	Bovee	Medium	359	12	Oval, pink.
36	Dooley	Large	354	48	Round, white.
37	Canadian Beauty	"	348	12	Oval, pink.
38	Pingree	"	337	12	Oval, white.
39	Irish Cobbler	Medium	337	12	Round, white.
40	Swiss Snowflake	"	335	..	Oval, white.
41	Early Rose	Large	308	36	Oval, red.

SUMMARY OF CROPS, 1905.

	Bushels.
Wheat:	
10 varieties, 44 acres	1,762
12 half acres, rotation test	174
40 uniform test plots	78
	2,014
Oats:	
12 varieties, 54 acres	5,070
2 half acres, rotation test	47
41 uniform test plots	206
	5,323

Barley:		
9 varieties, 35 acres	2,217	
1 half acre, rotation test	22	
34 uniform test plots	102	
	2,341	
Pease:		
5 varieties, 4 acres	193	
38 uniform test plots	117	
	310	
Flax	20	
Rye	13	
	Tons.	Lbs.
Emmer and Spelt	..	4,302
Corn, ensilage	70	
Hay:		
Brome grass	31	
Rye grass	10	
Sundry grasses	1	800
Alfalfa	2	1,200
Hay cut in coulees	25	
	70	
	Bushels.	
Roots	5,000	
Potatoes	145	

VEGETABLE GARDEN.

The tests made the past year with vegetables were on the whole very satisfactory.

Onions, carrots, beets and cabbage were sown or planted in duplicate plots. The one had vegetables the previous year, and was manured and ploughed after the vegetables were taken up. The second plot was fallowed in 1904. As will be observed, the vegetables on the fallowed plot gave the largest return.

Asparagus.

There was a good crop from the old beds of asparagus; in use May 14 to July 13. The varieties grown are Barr's Mammoth, Barr's Elmira and Conover's Colossal.

BEANS—SOWN MAY 14 AND 20.

Variety.	Sown May 14.		Sown May 20.		Remarks.	Length of Pod.
	In use.	Ripe.	In use.	Ripe.		
						In.
Currie's Rust-proof	Aug. 1	Sept. 7	Aug. 14	Sept. 24	Wax	4–5
Challenge Black	" 1	" 7	" 14	" 24	"	4-5
Early Six Weeks	July 29	Aug. 30	" 7	" 24	Green	5–6
Fame of Vitry	Aug. 3	Did not ripen.	" 14	Did not ripen.	"	6–7½
Extra Early	July 29	Aug. 30	" 7	Sept. 24	"	4–5
Haricot	Aug. 1	Sept. 7	" 14	" 24	"	4–5
Emperor of Russia	" 1	" 7	" 16	Did not ripen.	"	5–6½
Golden Skinless	" 1	" 7	" 16	Sept. 24	Wax	3–4
Black Speckled	" 1	" 20	" 18	Did not ripen.	Green	4–6
Dwarf Kidney	July 29	" 7	" 14	Sept. 24	Wax	4–5

BROCCOLI.

Sown in hot-house March 31; set out May 17. Crop was a failure.

BEETS.

Sown in garden May 10, and on fallow May 16; in use July 19; pulled October 10. When thinning the rows on June 24, a number were transplanted. These beets were larger and rougher than those left where they were sown.

Variety.	Yield per Acre.				Remarks.
	First Seeding.	Trans-planted.	Second Seeding.	Trans-planted.	
	Bush.	Bush.	Bush.	Bush.	
Long Red Blood	690	500	429	710	
Egyptian	610	750	298	824	Fairly smooth.
Turnip Blood Red	732	715	480	880	Smooth.
Nutting's Improved	732	520	242	806	Seed badly mixed.

BRUSSELS SPROUTS.

Sown in hot-house March 31; set out May 18; in use September 1. Covered with sprouts of good quality.

CARROTS.

Variety.	In use.	Yield per Acre.		Remarks.
		Sown in Garden Apl. 30.	Sown on Fallow May 6.	
		Bush.	Bush.	
Early Gem	Aug. 4	520	829	Good quality.
Long Blood Red	" 6	533	630	Good quality.
Chantenay	July 29	497	533	Very good.
French Horn	" 12	605	666	Good early carrot.
Half Long Luc	" 29	701	713	Good.

The carrots were pulled on October 10.

Cauliflower.

Sown in hot-house March 31; set out May 18; second seeding April 11; set out May 27.

Variety.	First Sowing in Garden.		Second Sowing on Fallow.		Remarks.
	In use.	Average Weight.	In use.	Average Weight.	
		Lbs.		Lbs.	
Snowball	July 7	5	July 20	6	Best quality.
Earliest Dwarf Erfurt	" 11	5	" 20	5½	Good.
Half Early Paris	" 18	6	" 22	6½	Good.

Cabbage.

Sown in hot-house March 31; set out in garden May 18. Second sowing April 11; set out on fallow May 27.

Variety.	1st Seeding.		2nd Seeding.		Remarks.
	In Use.	Average Weight.	In Use.	Average Weight.	
		Lbs.		Lbs.	
Early Paris Market	July 14	5	Aug. 6	6	Good quality.
Winnigstadt Early	" 17	7	" 6	9	"
Extra Early Express	" 17	6	" 10	7	"
Early Midsummer Savoy	" 24	5	" 14	5	Poor, soft heads.
Early Jersey Wakefield	" 24	6	" 14	6	Good, solid heads.
Fottler's Drumhead	" 24	9	" 14	9	" "
Large Flat Drumhead	" 24	11	" 14	10	" "
Green Globe Savoy	" 20	7	" 12	8	Good heads.

Garden Corn.

Variety.	Tassel.	In Silk.	Green In Use.	Ripe.	Remarks.
Red Squaw, sown May 20	July 3	July 17	Aug. 10	Sept. 7	Small cobs.
White Squaw " 20	" 3	" 17	" 10	" 7	"
Peep o' Day " 20	" 17	" 30	" 20	" 14	Good.
Red Squaw " 28	" 12	" 22	" 15	" 8	
White Squaw " 28	" 12	" 22	" 15	" 8	
Peep o' Day " 28	" 21	Aug. 1	" 25	" 16	
Cross (Squaw and Fordhook Ey.), sown May 28	" 26	" 4	" 31	" 24	Poor cobs; grown too near hedge.
Thorndike, sown May 31	" 22	" 5	" 26	.....	Cobs good size and quality. Cut Sept. 14, but not quite ripe.

Celery.

Five varieties were tested: White Plume, Paris Golden Yellow, Rose-ribbed Paris, Red Large-ribbed and Giant Pascal. Sown in hot-house April 2; transplanted May 4; set out June 7; White Plume in use August 20, the other varieties September 1. The celery did not grow very large, but was of good quality.

Cucumbers.

Sown April 20 in hot-house; set out May 23.

	Average length.	Remarks.
Early White Spine, in use from Aug. 11, until Sept. 25	6 in.	Good crop.
Cumberland " " 20 " " 25	8 "	"
Long Green " " 21 " " 25	8 "	"

The young plants were frozen back on June 24, and took 3 weeks to recover.

Citrons.

Red Seeded citron was sown in hot-house April 20; set out May 23; killed by frost June 24. Also sown in open June 24; a little fruit ripened September 30, averaging only 3 inches in diameter.

Lettuce.

Variety.	1st Sowing.	In Use.	Remarks.
All the year round	April 20	June 5	Fair.
Red Edged Victoria	" 20	" 5	"
Brown Stonehead	" 20	" 1	Very good.
Neapolitan	" 20	May 29	Best of all.
Trocadero	" 20	June 5	Fair.
Tom Thumb	" 20	" 5	Small, solid heads.
Cos, Trianon	" 20	" 5	Solid, coarse.
Cos, Green Paris	" 20	" 5	" "

Second seeding May 13; in use June 24. Third seeding June 10; in use July 18. Fourth seeding July 14; in use September 1. Fifth seeding July 29; in use September 24.

Melons.

Musk melon—Hamilton Market and New Garden Lemon, and Water melon—Phinney's Early were sown in hot-house April 20; set out May 23; injured by frost, June 24.

They were also sown in open on June 2. Hamilton Market ripened three melons of fair quality on September 16; the other sorts did not mature.

ONIONS.

Sown in open, April 30; pulled September 22.

Variety.	Size.	Yield per Acre.	Remarks.
		Bushels.	
Large Red Wethersfield	Large	266	Firm, good quality.
Silverskin	"	254	Rough, good for summer use.
Market Favorite	Medium	157	Fair quality.
Yellow Globe Danvers	"	145	Good.
Trebon's Large Yellow	Small	90	Did not mature properly.

Sown in open, May 6; pulled September 22.

Yellow Globe Danvers	Large	242	These would have yielded better, but high wind covered seed too deeply with drifting soil.
Trebon's Large Yellow	"	229	
Silverskin	"	223	
Large Red Wethersfield	Medium	175	
Market Favorite	Large	157	

Sown in hot-house, April 2; set out May 6; pulled September 22. Mixed seed.

Mixed seed	Very large	205	Very fine quality.

PARSNIPS.

Sown May 10; in use September 10.

Manitoba Prize Intermediate, 774 bushels per acre; solid, good quality. Hollow Crown, 484 bushels per acre; fair quality.

PARSLEY.

Moss Curled and Triple Curled, sown May 17; in use July 19. Made a fine growth.

PEPPERS.

Large Red Pepper. Sown in hot-house April 1; set out June 3. Pods about 4 inches long, but did not ripen.

PUMPKINS.

Large Yellow Field Pumpkin, sown in hot-house April 20; set out May 23; first ripe September 12. A good crop of fair sized pumpkins.



Mensury Barley in Stook, Experimental Farm, Indian Head, Sask.

Garden Pease.

Sown May 5 and May 16. Each lot did well.

Name.	Size.	In use.	Ripe.	Remarks.
Admiral	Small	July 26	Aug. 22	
Alaska	"	" 14	" 18	
American Wonder	Medium	Aug. 2	" 24	Best medium.
Anticipation	Large	" 2	" 28	Very good.
Burpee's Profusion	"	" 2	Sept. 2	
Extra Early	Medium	July 14	Aug. 16	
Everbearing	"	Aug. 2	" 26	
First of All	"	July 12	" 16	Good early pea.
First and Best	"	" 20	" 24	
Champion of England	"	Aug. 6	" 28	
Harrison's Glory	"	" 6	Sept. 1	
Horsford's Market Garden	Small	" 6	Aug. 28	
Laxton's Charmer	Medium	" 8	Sept. 1	
Nott's Excelsior	"	July 21	Aug. 18	Good quality.
Premium Gem	"	" 31	Sept. 1	
Rural New Yorker	Small	" 17	Aug. 16	
Surprise	"	" 14	" 16	Best early pea.
Stratagem	Very large	Aug. 8	" 30	Best all round pea.
Shropshire Hero	Medium	July 30	" 28	Poor crop.
Wm. Hurst	Small	" 21	" 21	One of the earliest.
Yorkshire Hero	Medium	Aug. 6	Sept. 1	Extra good.

Radish.

Five sowings of radishes were made, on April 30, May 9, May 28, June 24 and July 29. The first seeding grew too slowly, and the radishes were hot and stringy. The last seeding was too late. Following are results from other three seedings:—

Variety.	2nd Seeding. In use.	3rd Seeding. In use.	4th Seeding. In use.	Remarks.
Early Turnip Scarlet	June 12	June 28	July 21	Good quality.
Deep Scarlet	" 12	*	" 23	Fair quality.
Olive Scarlet	" 14	*	" 23	Very tender and crisp.
Olive White-tipped	" 14	June 30	" 23	" "
Early Scarlet White-tipped	" 12	*	" 23	Good.

*Not sown at third seeding.

Winter Radish.

Sown July 10 and 29; pulled October 20. Second sowing too late, and did not come to much.

Black Spanish, very large, but of poor quality.

Scarlet China, large and of good quality.

Sage.

Sown May 17; in use July 15; pulled September 12; very good.

Savory.

Sown May 17; in use July 15; pulled October 20; fair.

SPINACH.

Bloomsdale and Victoria, sown May 17; in use July 12; quality good.

TOBACCO.

Six varieties were sown in hot-house, April 3; transplanted to garden, June 3.

Name.	In Bloom.	First fit to pull.
Connecticut	July 1	August 25
Small Red Canadian	" 6	" 22
Cannelle	" 1	" 20
White Burley	" 1	" 12
Primus	" 8	" 22
Zimmer's Special	" 3	" 16

All varieties did well.

TOMATOES.

Sown in hot-house, April 3; set out May 28 in three plots: '1' on fallow; '2' in a garden plot, and '3' in garden rather too close to a tall hedge, which caused a great reduction in the yield, though on the north of the plants. The plants were put out three feet apart, the rows also were three feet apart. All tomatoes which had not ripened by September 15 were pulled on that date for use in pickling.

Variety.	First Ripe.	Number of Plants.	Yield.	Colour and Quality.
Plot 1—				
Earliest of All	Sept. 8	20	5 bush.	Scarlet, go d, large, but rather rough.
Plentiful	" 11	20	2½ "	Pink, fine and smooth.
Plot 2—				
Earliest of All	Did not ripen	17	3 "	
Plot 3—				
Earliest of All	Sept. 8	10	¼ "	Very small.
Plentiful	" 12	10	¼ "	"

TABLE TURNIPS.

Sown May 22; pulled October 10.

Yellow Golden Ball, in use July 14; yield per acre, 1,365 bush. Good, solid.

White Milan, in use July 10; yield per acre, 1,148 bush. Some hollow.

Early White Flat American, in use July 14; yield per acre, 1,087 bush. Some hollow.

Early Stone, in use July 14; yield per acre, 863 bush. Many hollow.

All were bitter in flavour.

RHUBARB.

Old beds in use May 20.

Tobolsk, good quality

Herb, very poor,

Victoria, good quality and growth.

Prince Albert, poor.
Royal Albert, good.
Salt's Perfection, good.
Prince of Wales, very good.
Royal Linnæus, very good.
Magnum Bonum, very good.
Strawberry, very good, rather small stalks.
Early Crimson, very good.
Early Scarlet, very fair.

Seed of the following varieties was sown on May 6:—

Myatt's Linnæus.
Fottler's Improved.
Scarlet Nonpareil.
Prince Albert.
Victoria.
Royal Linnæus.
Strawberry.
Salt's Perfection.
Early Crimson.
Monarch.
Magnum Bonum.
Early Prince.
Brabant's Colossal.

THE FLOWER GARDEN.

The flower garden was again very good; most of the varieties grown flowered profusely, and proved a great attraction to visitors during the summer months.

ANNUALS.—Propagated in hot-house. Sown April 1 and 3.

Variety.	Set out.	Bloom. From	Bloom. To	Remarks.
Asters, 10 varieties	May 23	July 16	Sept. 30	Some very fine blooms.
Antirrhinum majus nanum	June 2	" 16	" 26	Fine.
Abronia umbellata	" 12	Aug. 24	" 26	Fair.
Ageratum, dwarf	" 12	July 24	" 26	Fine border.
Balsam, Camellia-flowered	" 1	" 18	" 14	Very good.
Brachycome iberidifolia	" 1	" 8	" 26	Attractive.
Bartonia aurea				Did not germinate.
Chrysanthemum coronarium	June 2	July 2	Oct. 10	Very fine.
Clarkia				Did not germinate.
Coreopsis, 3 varieties	May 26	July 9	Oct. 5	Quantity of bloom.
Dianthus, 4 varieties	" 25	" 9	" 10	Very fair show.
Gaillardia picta	June 2	" 12	" 5	Very good.
Godetia splendens				Did not germinate.
Helichrysum, double mixed	June 2	July 20	Sept. 26	Fair.
Iberis Gibraltarica				Did not germinate.
Lavatera rosea splendens	June 12	July 14	Oct. 5	Pink blooms, very pretty.
Lobelia, Crystal Palace				Did not germinate.
Marigold, Double Royal	June 2	July 20	Oct. 10	Bloomed very freely.
Mignonette	" 2	" 1	" 10	Very fine and sweet.
Nicotiana affinis	" 3	" 6	" 10	Very fine indeed.
Nasturtium	May 27	June 20	Sept. 1	Grand show.
Poppy, 6 varieties	" 27	" 21	" 1	Did splendidly, but sown rather too early in hot-house.
Portulaca	June 5	July 12	" 26	Very fine.
Phacelia				Did not germinate.
Phlox Drummondii, 4 varieties	May 26	June 21	Oct. 10	Very good.
Petunia, 3 varieties	" 26	July 1	" 10	Made a grand bed.
Pansies, many varieties	June 4	June 15	" 26	Very fine, some double.
Scabiosa, 2 varieties	" 2	July 21	" 12	Very good.
Sweet William	" 4	Biennial		Made good growth.
Salpiglossis	"			Did not germinate.
Stocks	May 23	June 22	Oct. 1	Some fine, but many single.
Tagetes, mixed	June 2	" 23	" 12	Bloomed well.
Zinnia elegans	" 2	July 8	" 5	"

ANNUALS—Sown in open, May 10.

Variety.	Bloom.		Remarks.
	From	To	
Antirrhinum	Aug. 4	Oct. 15	Fair.
Salpiglossis	" 8	" 10	Very handsome.
Gaillardia	" 8	" 10	Very good.
Nasturtium	July 20	Sept. 26	Did well.
Phacelia	" 20	" 26	Small blue flower.
Clarkia	" 26	" 26	Very fair.
Tagetes	" 18	Oct. 10	Very fine show.
Godetia	Aug. 8	Sept. 26	"
Poppy	July 27	Oct. 10	Good show.
Dianthus	Aug. 8	" 10	Did well.
Eschscholtzia	July 12	" 10	Bloomed very freely.
Bartonia aurea	" 16	Sept. 26	Did well.
Marigold	" 16	Oct. 1	"
Maize, Striped-leaved	.....	.....	Pretty leaf, 5 ft. high.
" Japonica gigantea	.....	.....	"
Scabiosa	Aug. 20	Oct. 12	Very fine.
Celosia	" 16	Sept. 14	Poor.
Nemophila	June 12	" 4	Bloomed freely.
Ageratum	July 26	" 26	Very pretty.

Sweet Pease.—32 varieties, sown April 22 and 27.

Earliest of All, in bloom July 4; fine blooms.
Earliest Sunbeams, in bloom, July 5; cream, very pretty.
McKenzie's Selection, in bloom, July 10, fair.
Laura Belle, in bloom, July 10; very good, mixed.
Eckford's Hybrid, in bloom, July 12; fair, mixed.
Tom Thumb, in bloom, July 18; fine for borders.
Blushing Beauty, in bloom, July 12: delicate pink; small, free bloomer.
New Bush, in bloom, July 15, 2½ feet high.
Double Flowering, in bloom, July 12; nice mixture.
Mrs. Walter Wright, in bloom, July 14; lavender, fine bloom.
King Edward VII., in bloom, July 14; scarlet, very fine.
Marchioness of Cholmondeley, in bloom, July 14; primrose, pink edge, good.
Mrs. Sydenham, in bloom, July 16; pink and flesh colour.
Orchid Flowering, in bloom, July 12; very fine, mixed.
Blanche Burpee, in bloom, July 12, pure white, rather small.
Navy Blue, in bloom, July 12, fine.
Burpee's Latest Special, in bloom, July 14, very fine indeed.
Hon. Mrs. Kenyon, in bloom, July 12; primrose, large free bloomer.
Dorothy Eckford, in bloom July 12; pure white, grand blooms.
Othello, in bloom, July 20; very dark, shy bloomer.
Sunproof, in bloom, July 14; scarlet, very fine.
Aurora, in bloom, July 12; striped pink and white.
Burpee's Dainty, in bloom, July 12, white, pink edge, very pretty.
Florence Spencer, in bloom, July 14; pink, large and half-double.
Scarlet Gem, in bloom, July 12; free bloomer, sunburns badly.
Jessie Cuthbertson, in bloom, July 14; good.
Lady Grisel Hamilton, in bloom, July 12; very handsome.
Agnes Johnston, in bloom, July 14; cream, pink and flesh colour.
Golden Rose, in bloom, July 12; cream.
Coccinea, in bloom, July 12; peculiar red.

Mrs. Dugdale, in bloom, July 14; shaded pink, very pretty.
Mrs. Wilmott, in bloom, July 14; large blooms.
The best of the blooms were over by September 10.

The following varieties of flowers were sown in the open on April 20 as borders to flower beds:—

Variety.	Bloom.		Remarks.
	From	To	
Mignonette	June 20	Oct. 13	Too large variety for border.
Whitlavia	" 30	Aug. 16	Poor.
Scabiosa	Aug. 6	Oct. 10	Fair, rather tall.
Phlox	July 20	" 10	Very good border.
Eschscholtzia	" 2	" 1	Good, but rather large.
Nemophila	June 10	Aug. 1	Good, but over too soon.
Candytuft	July 15	" 15	Very good border.

Sown in hot house April 1; set out June 2:—
Antirrhinum, Tom Thumb, in bloom from July 12, to September 26; very fine border.
Ageratum dwarf, in bloom from July 24, to September 26; fine border.

Perennials.

All the old beds of perennial flowers made luxuriant growth the past season, and below are given some of the more noticeable ones, with time of flowering:—

Achillea, in bloom from July 1.
Clematis, in bloom from July 3, to August 10.
Centaurea macrophylla, in bloom from July 8.
Cactus, ground, in bloom from July 8, to August 4.
Columbine, in bloom from June 6 to August 1.
Campanula macrantha, in bloom from July 6 to September 1.
Delphinium, in bloom from July 15 to August 20.
Everlasting Pea, in bloom from July 8 to July 30.
Hollyhock, in bloom from August 7 to September 11.
Helianthus autumnalis, in bloom from July 24.
Irises, in bloom from May 20 to July 8.
Lupins, in bloom from June 30 to August 20.
Lilium elegans (orange), in bloom from July 5 to October 10.
" Tiger lily, in bloom from July 11 to July 30.
" white varieties, in bloom from July 23 to October 10.
Lychnis, in bloom from July 1 to August 30.
Mint, in bloom from July 15.
Paeonia tenuifolia, in bloom from May 23 to June 7.
Paeonies, other varieties, in bloom from June 25 to July 23.
Spiræa filipendula, in bloom from July 12.
" ulmaria, in bloom from July 8.
Sweet William, in bloom from July 4 to September 15.
Tulips, in bloom from May 10 to June 14.
Veronica salurgoides, in bloom from July 18 to September 1.

Special mention must be made of the Pæonies, which bore an abundance of magnificent blooms. Tulips, Irises, Cannas and Dahlias, were all extra fine. A large

number of bulbs, roots, &c., of all the above species were sent up from the Central Experimental Farm, in the fall of 1904, or last spring. They nearly all did very well, and made a very fine show all the season.

A very fine collection of Lily bulbs sent also, including the following varieties:—*Lilium elegans, L. Krameri, L. concolor, L. speciosum rubrum, L. auratum, L. Brownii* and *L. elegans flore pleno, L. giganteum, L. longiflorum* and *L. multiflorum.* Nearly all these flowered profusely, and were greatly admired.

This fall another collection of bulbs of the following sorts has been sent up from the Central Farm, and set out in the gardens and grounds:—Tulips, single and double; Narcissus; Iris; Squills; Crocus; Snowdrops. There are several hundred bulbs in all, and it is hoped they will make a fine show next year.

TREES AND SHRUBS.

Trees and shrubs made a most vigorous growth during the past season, with the exception of the maples (native). These were attacked by aphis, and in some cases greatly injured.

Several long hedges of maple were dug up in the spring on account of doing injury to fruit and other bushes by shading them too much from the sunlight and air. Others will be removed next spring for the same cause.

Among the most attractive of the shrubs during the flowering period were a fine group of Lilacs, set out in 1901, which bloomed for the first time this year. The varieties named in the following list were covered with blossom:—

Syringa vulg. Maxime Cornu.
" " La Tour d'Auvergne.
" " de Marly.
" " Pres. Grevy.
" " Mathieu de Dombasle.
" " Lemoinii fl. pl., (White).
" " Mdme. Casimir Périer (White).
" " Chas. Joly.
" " Francisque Morel.
" " Virginité.
" " Madame Lemoine (White).
" " Rubella Plena.
" " Michael Buchner.
" " Condorcet.
" " Marie Legraye (White).

Several other varieties made good growth, but did not bloom.

Other conspicuous flowering trees and shrubs were—Prunus Maackii, Prunus Grayana maxima, Caragana, Tartarian Honeysuckle, Hawthorn and Siberian Crab.

A large bundle of tree and shrub seedlings was sent from the Experimental Farm Ottawa, last spring. Some of these were planted in the Arboretum, and the rest in a part of the grounds where it is proposed to establish a collection of some of the most attractive and best growing sorts. A list of the varieties is appended:—

Euonymus linearis,
Viburnum lentago,
Philadelphus nepaulensis,
" grandiflorum,
Ceanothus americanus,
Cornus sibirica variegata,
Populus angustifolia,
Japan Tree Lilac,
Retinospora ericoides,
Thuya occid. globosa,
" pyramidalis,
" Wareana lutescens,
Picea Englemanni,
Pinus sylvestris globosa,
" Beauvonensis,
Picea excelsa pygmaea,

Acer dasycarpum. Seed from Winnipeg.
Symphoricarpus (Gilbert Plains),
Syringa amurense,
Sea Buckthorn,
Pinus inops,
Juniperus Schottii,
Pinus cembra.
Golden Juniper,
Juniperus sabina variegata,
Abies excelsa procumbens,
" " pyramidalis.

THE ARBORETUM.

The trees and shrubs under observation in the Arboretum came through the winter very well, and made a good start in the spring, owing to the early season. Though the protection afforded by snow was comparatively light, through the light snowfall, yet, as the winter was on the whole mild, the trees did not kill back any more than usual. During the summer, the abundant rains caused an extra strong growth in all varieties.

The following additions were made to the Arboretum last spring, from the supply of trees, &c., sent up from the Central Farm:—

Syringa amurense,
Japan Tree Lilac,
Cornus sibirica variegata,
Symphoricarpus (Gilbert Plains),
Viburnum lentago,
Acer dasycarpum (Seed from Winnipeg),
Populus angustifolia,
Viburnum opulus (Riding Mountains),
Philadelphus nepaulensis,
Euonymus linearis,
Austrian Pine,
Red Pine,
Scotch Pine.

PLANTING TREE SEEDS.

Many inquiries are made during the year as to the best way to grow tree seeds in the Territories, where usually at the time they are sown, the soil is very dry. For several seasons, little or no trouble has been experienced from this cause on the Experimental Farm, while in some districts the weather has been very dry.

Maple seeds can be sown late in October, or early in May. It is not safe to sow all the supply of maple seed in the fall, as very often germination takes place too early in the spring, and frost kills the entire crop.

Ash seed should be sown in October. Elm seed should be sown as soon as gathered in June, though it sometimes succeeds if sown the following spring.

Elm seed requires a very light covering of fine, moist soil, not over ½-inch in thickness, while maple and ash should be covered 1 or 1½ inches.

Tree and shrub seeds should be sown in rows about 30 inches apart to permit horse cultivation when considerable quantities are grown. In all cases the land should be prepared the year preceding sowing, so as to have the soil as fine as possible. Breaking and backsetting new land, and summer-fallowing old, make the best and safest preparation.

Trees should be transplanted when seedlings are 2 years old. When left until 3 or 4 years old, the trouble and expense are greatly increased.

A large quantity of tree and shrub seedlings and seeds are available for next spring's distribution. A list of a few of the best is given, with the uses to which they are adapted.

Common Name.	*Botanical Name.*
For shelterbelts or windbreaks—	
Native Maple, or Box Elder.	Negundo aceroides.
Voronesh Willow.	Salix voronesh.
Sharp-leaved Willow.	Salix acutifolia:
Green Ash.	Fraxinus pennsylvanica.
For avenue or shade—	
American Cottonwood.	Populus deltoidea.
" Elm.	Ulmus americana.
Russian Poplar.	(Several species).
Mountain Ash, American.	Pyrus americana.
For hedges—	
Siberian Pea Tree.	Caragana arborescens.
Common Cotoneaster.	Cotoneaster integerrima.
Common Lilac.	Syringa vulgaris.
Tartarian Honeysuckle.	Lonicera tatarica.
Native Hawthorn.	Crataegus crus galli.
Scarlet Haw.	Crataegus coccinea.
Breaking Buckthorn.	Rhamnus frangula.

For ornamental shrubbery those recommended for hedges are useful, and also the following:—

Dwarf Caragana.	Caragana pygmæa.
Sorbus-leaved Spiræa.	Spiræa sorbifolia.
Spiræa arguta.	Spiræa arguta.
Van Houtte's Spiræa.	Spiræa Van Houttei.
Japanese Spiræa.	Spiræa Japonica.

Climbers for porches, &c.:—Virginia Creeper, Clematis, Hops, Climbing Honeysuckle, and Wild Cucumber.

FRUIT TREES.

PLANTING.

Last spring several hundred cross-bred apples and seedlings were sent up from the Experimental Farm, Ottawa, and planted. A list of the varieties and numbers is given below.

Cross-bred Apple Trees.

5 Charles.	2 Aurora.	2 Ruby.
10 Columbia.	6 Pioneer.	2 Carleton.
8 Bow.	10 Alberta.	5 Prince.
5 Eve.	5 Dawn.	2 Northern Queen.
6 Tony.	5 Manitou.	3 Elsa.

Seedlings of Cross-bred Apples.

19	Seedlings of	Sparta.	20	Seedlings of	Jewel.
2	"	Olive.	26	"	Foster.
2	"	Susan.	9	"	Robin.
4	"	Gordon.	7	"	Silvia.
7	"	Cluster.	8	"	Madge.
3	"	Jane.	20	"	Golden.
2	"	Bude.	8	"	Lizzie.
11	"	Akers.	6	"	Raymond.
25	"	Sankey.	3	"	Pringle.
13	"	Aurora.	20	"	Carleton.
28	"	Manitou.	10	"	Stork.
30	"	Tony.	13	"	No. 572.
38	"	Alberta.	12	"	Derby.
7	"	Prince.	6	"	Dawn.
26	"	Garnet.	7	"	Edna.
10	"	Pioneer.	19	"	Caleb.
1	"	Dean.	9	"	No. 432.
17	"	Columbia.	2	"	Blushed Calville.
3	"	Sam.	3	"	Small Red Apple.
11	"	Eaton.	2	"	Hare Pipka.
2	"	Hudson.	8	"	Elsa.
17	"	Stork.	4	"	No. 768.
20	"	Northern Queen.	3	"	No. 218.
18	"	Mary.	7	"	No. 570.
9	"	Romney.			

These were all set out in new plots of ground, being planted 15 feet apart each way, or else being used to fill vacancies in the older orchards. The balance were put in nursery rows till room can be found for them in a plot which is being prepared.

PLUMS.

Twelve seedlings of Carstesen plum and one of Aitkin plum were received, and planted in the plum orchard.

FRUIT CROP.

SIBERIAN CRAB (*Pyrus baccata*).

The Siberian Crab trees fruited well as usual, but the crop was hardly as heavy as in 1904.

CROSS-BRED APPLES.

A few of the Cross-bred apple trees fruited this year, namely, Cavan, No. 19, Aurora, No. 45. The fruit was considerably larger than the Pyrus baccata, but most of the large ones were stolen long before they were ripe.

Some seedling trees of cross-bred apples also fruited, but in most cases reverted more or less to the original type of Pyrus baccata, and consequently will be discarded, being of no greater value than the baccata.

PLUMS.

A remarkably heavy crop of fruit set, and for the most part, completely ripened, as this year there were no frosts sufficient to harm the fruit before October. A number of branches were broken down by the weight of plums.

Manitoba Native, Weaver and Aitkin Plums all produced abundantly.

SAND CHERRY.

Seedling of Wonder Sand Cherry, planted 1901. This fruited for the first time this year. The fruit was quite a good size and sweet.

SMALL FRUITS.

CURRANTS.

A very heavy crop of fruit set, but was attacked by the currant maggot (*Epochra canadensis*), and at the time of ripening it was found that more than half the crop was infested with the maggots, causing the fruit to be valueless, unless very carefully picked, which was a slow and tedious job.

RASPBERRIES.

The raspberry crop was good. The frequent rains during July and the early part of August when the fruit was filling, helped it considerably.

Marlborough, Caroline, Kenyon Seedling, Dr. Reider, Garfield, Mary, Turner and Miller raspberries, with Older and Hillborn black caps are the varieties being grown at present.

GOOSEBERRIES.

Gooseberries were practically a failure this year. Some of the bushes had a few berries on, but the majority were quite bare.

STRAWBERRIES.

The strawberry plants set out in 1904 came through the winter satisfactorily, but did not produce any fruit, except a few odd berries. They have been well covered up again this fall, and it is hoped they will fruit well next season.

CATTLE.

The herd of cattle at present consists of 19 pure bred Shorthorn females and 7 bulls, and 28 grade animals.

Last winter the entire herd was tested for tuberculosis, and not one reacted.

AUCTION SALE OF PURE BRED STOCK.

An auction sale of pure bred shorthorn cattle and of swine was held on May 11 last.

On the two preceding days and nights rain and snow fell, making the roads almost impassable, causing a very small attendance.

Four head of cattle and two pigs were sold, and the others were withdrawn.

FEEDING TESTS.

On December 2, 4 three-year old steers were purchased, and on December 14, 4 two-year olds, with the object of ascertaining at which age the animals could be most economically fattened. They were tested with tuberculin and found to be healthy.

The test was for 16 weeks, commencing on December 16 and ending on April 7.

The steers were divided into two lots; Lot 1 comprising the 2 year-old animals, and Lot 2 the 3 year-olds, and were fed the following ration:—

Lot 1, per head, per day.—11 lbs. ensilage, 8 lbs. straw, 12 lbs. roots and ½ lb. ground linseed. In addition, meal was fed at the rate of 2 lbs. for each animal per day, and increased by 2 lbs. each month during the test.

Lot 2, per head, per day.—15 lbs. ensilage, 14 lbs, straw, 15 lbs. roots and ½ lb. ground linseed. Meal, 4 lbs. each per day for first month, increased 2 lbs. per day each month of test.

The straw was cut, and mixed with the ensilage before being fed.

The meal used consisted of two parts barley and one part small wheat.

Before the test started the animals were fed the same ration as during the first month of test, except that only ¼ lb. of ground linseed was fed, instead of ½ lb. After test was completed till the steers were sold on April 25, they were fed the same as during the last month of test.

Following will be found a statement of the total amount and estimated value of the feed consumed, the monthly and total weights and gains of each lot during the test, and a summary of the financial result of the transaction.

TOTAL WEIGHT AND ESTIMATED VALUE OF FEED CONSUMED DURING THE WHOLE PERIOD FROM DATE BOUGHT TILL SOLD.

Before Test Started (Lot 1, 2 Days, Lot 2, 14 Days).

Feed.	Value.	Lot 1.		Lot 2.	
		Lbs.	Cost.	Lbs.	Cost.
			$ cts.		$ cts.
Ensilage	$2 per ton	88	0 09	840	0 84
Straw	$1 "	64	0 03	784	0 39
Roots	5c. per bush.	80	0 07	560	0 47
Meal	⅔c. per lb	16	0 10	224	1 49
Ground linseed	2c. "	2	0 04	14	0 28
			0 23		3 47

During Test (112 Days).

Ensilage	$2 per ton	4,928	4 92	6,720	6 72
Straw	$1 "	3,584	1 79	6,272	3 13
Root	5c. per bush.	5,376	4 48	6,720	5 22
Meals	⅔c. per lb	2,240	14 93	3,136	20 90
Ground linseed	2c. "	186	3 72	186	3 72
			29 84		39 69

Till Sold (18 Days).

Ensilage	$2 per ton	792	0 79	1,080	1 08
Straw	$1 "	576	0 29	1,008	0 50
Roots	5c. per bush.	864	0 72	1,080	0 90
Meal	⅔c. per lb	576	3 84	720	4 80
Ground linseed	2c. "	36	0 72	36	0 72
			6 36		8 00

Summary Cost of Feeding.

——	Lot 1.	Lot 2.	Total.
	$ cts.	$ cts.	$ cts.
Before test	0 33	3 47	3 80
During test	29 84	39 69	69 53
Till sold	6 36	8 00	14 36
Total	36 53	51 16	87 69
Average per steer	9 13	12 79	

Monthly Weights and Gains During Test.

——	Lot 1.	Lot 3.
	Lbs.	Lbs.
Weight at start of test	2,880	4,900
End of 1st 4 weeks—Weight	2,980	5,100
" " " Gain	100	200
" 2nd " Weight	3,260	5,330
" " " Gain	280	230
" 3rd " Weight	3,490	5,570
" " " Gain	230	240
" 4th " Weight	3,740	5,880
" " " Gain	250	310
Total gain during test	860	980

Summary of Financial Result of the Transaction.

——	Lot 1.	Lot 2.
Weight bought	2,880 lbs.	5,125 lbs.
At	$ 20 00 per head.	$3\frac{1}{8}$ cents per lb.
Amount paid	80 00	$160 15
Cost of feed	36 53	51 16
Total cost	116 53	211 31
Weight when sold	3,840 lbs.	6,000 lbs.
Less 5 per cent shrinkage	192	300
Net weight sold	3,648	5,700
At	$3\frac{3}{4}$ cents.	4 cents.
Amount received	$136 80	$228 00
Total gain in weight	960 lbs.	875 lbs.
Average gain per steer	240 "	219 "
Net profit	$ 20 27	$ 16 69
Profit per steer	5 07	4 17

HORSES.

There are 13 horses now on the farm. Since sending in my last report, the following changes have taken place: One horse died, two old mares were shot on account of extreme age, and a herd pony was exchanged. A span of driving horses and one work horse have been bought, and last spring a colt was born.

SWINE.

Last spring a Yorkshire white boar and sow were sent to the farm from the Central Farm at Ottawa, and have done well since their arrival. During the past

twelve months 2 Berkshire boars and 7 sows, and 2 Tamworth boars and 1 sow have been sold to farmers for breeding purposes.

There are at present on the farm 11 Yorkshire White, 23 Berkshire and 9 Tamworth pigs.

POULTRY.

Barred Plymouth Rock, Black Minorca and Light Brahma fowls are kept. Settings of eggs and young fowls are sold to applicants so far as the supply permits.

Record was kept of the number of eggs laid by each breed for 7 months, April to October inclusive, and the results are given below:—

—	Plymouth Rocks.			Black Minorcas.			Light Brahmas.		
	Hens.	Eggs.	Eggs per hen.	Hens.	Eggs.	Eggs per hen.	Hens.	Eggs.	Eggs per hen.
April	10	171	17·1	13	183	14·1	8	93	11·6
May	10	128	12·8	13	199	15·3	8	87	10·9
June	11	137	12·5	14	102	7·3	7	61	8·7
July	12	138	11·5	14	86	6·1	6	32	5·3
August	12	142	11·8	14	120	8·6	6	20	3·3
September	12	100	8·3	14	57	4·1	5	10	2·
October	12	65	5·4	14	19	1·4	5	0	0·
Total	.....	881	.....	.....	766	.....	.....	303	.....
Average No. hens	11·3	.....	.....	13·7	.....	.....	6·4	.....	.....
" " eggs per hen	.....	78	.....	.....	56	.....	.....	47	.....

INSTITUTE MEETINGS.

I had the pleasure of attending institute meetings in the month of June, in company with Mr. George Harcourt (then superintendent of institute work for the Territories), at Kyle, Shanon, Kinistino, Melfort, Birch Hills and Red Deer Hill, all south or southeast of Prince Albert in Saskatchewan. These meetings were arranged by the Department of Agriculture at Regina, and all, with one exception, when heavy rain interfered, were very well attended.

These meetings gave me an opportunity of seeing the growing crops throughout a large section of the country, as well as of seeing the general conditions of farming carried on in the northern settled part of Saskatchewan. For some weeks prior to my visit, the weather in the north had been very dry, and grain as a rule was further advanced than in the southern districts, but was not so heavy, and weeds were more noticeable. The crops however on the whole looked very well, with many very fine fields of wheat and oats.

Having visited this section of country several years ago, when there was no railroad, or way of disposing of the products grown, except teaming very long distances to market, it gave me great pleasure to visit field after field of grain, and to see alongside cars ready to take it to the consumer. Then, Melfort and Kinistino consisted of a post office and a school. Now, both are large and ambitious towns, giving good evidence of what two magnificent districts can do, when facilities are provided for taking out of the country its products.

GRAIN DEALERS' TRIP.

Through the kindness of the grain dealers of Winnipeg, I enjoyed a trip of three days' duration before harvest time through the wheat fields of part of Assini-

boia and Manitoba. The crops along the new railway lines from Regina, by way of Arcola to Brandon, and from Kirkella to Lipton, were especially interesting to me, as it was my first visit through these new and fast-growing settlements.

Needless to say, grain looked fine everywhere, and in some districts, harvesting was under way.

TRIP THROUGH ALBERTA DURING HARVEST TIME.

It was my great privilege during the latter part of August, and early in September, to take an extended trip through the newly formed province of Alberta, with yourself, and to see with much pleasure the large crops of grain being harvested, and in some cases threshed.

At High River and Claresholm (on the Canadian Pacific Railway from Calgary to Macleod) extended trips were made through the districts, and on all sides fall wheat was either in stook or being threshed. Spring wheat and oats were being cut, and everywhere the grain was very fine indeed. At Leavings and Macleod the crops were also very fine.

On reaching Lethbridge, a special train was placed at our disposal to see the grain fields as far as Cardston, through the kindness of Mr. A. T. Galt, president of the Galt Coal Mines, and of Mr. Magrath, the latter accompanying us over the line. On account of dry weather the crops did not appear so heavy south of Lethbridge as further north, but everywhere evidence was seen of large fields being sown with winter wheat; one field alone contained 2,000 acres.

At Raymond, the large sugar factory was being put in order for its harvest. On all sides sugar beets were observed, and those fields examined were certainly extra good.

As soon as possible after the new province was born, Edmonton was reached, and a few days spent among the grain fields surrounding the future capital. Everywhere the crops were fine, very many were in stook. Winter wheat was not grown so extensively in the north as in the south the past season, but considerable had been sown in all the districts visited.

The districts of Lacombe, Red Deer and Innisfail were in turn visited, and as in all others the grain was partially in stook, threshed and standing, but everywhere it was good, with a few exceptions where hail had unfortunately some time before visited strips of the country we passed through.

An afternoon was spent visiting the Canadian Pacific Railway irrigation canal at Calgary, where most extensive work was being carried on, and which will in future prove of vast benefit to a very large section of country.

After returning home, and spending two days, a start was made for Battleford. It gave me great pleasure to visit for the first time the ancient capital of the Territories.

North Battleford, which came into existence three months before, was all bustle, from the many land seekers making it their headquarters while looking up homesteads, and from the erection of the many new buildings.

The crops from Regina north to and about Saskatoon were very fine, nearly all were in stook, with considerable threshing done at several of the stations, especially about Dundurn and Saskatoon. Along the Canadian Northern Railway from the Junction to Battleford, the country is being newly settled, but many towns have sprung up along the line, and in a year or two the whole country will no doubt be fully settled.

EXCURSION TO THE EXPERIMENTAL FARM.

The Department of Agriculture at Regina ran excursion trains from Fleming on the east and Caron on the west, and from Prince Albert in the north, a distance of

over 400 miles, on July 19, when over 3,000 people visited the Indian Head Farm. Classes in stock-judging, butter-making and domestic cooking were carried on during the day in large tents specially provided.

In addition to the farm's staff of men and horses employed in conveying the large crowd over the farm, many of the town and country people also kindly gave their assistance, and during the time between the arrival and departure of the trains, the farm presented a very lively appearance. Every field and plot was visited by the largest and most agreeable company that has ever taken possession of the farm.

On July 4 large numbers attending the Indian Head sports visited the farm; and on August 8 and 9, during the Central Assiniboia Exhibition held at Indian Head, great numbers drove and walked through the grounds.

DISTRIBUTION OF SAMPLES.

During the months of March, April and May, the usual distribution of samples of the products of the Farm was made to residents in Assiniboia, Alberta and Saskatchewan.

As there was an increase in the number of applications of over 30 per cent compared with those received in the winter of 1903-4, and the supply of samples was no greater than usual, a very large number were disappointed.

The samples distributed were as follows:—

Wheat	546	bags of 3 lbs. each.
Oats	406	" 3 "
Barley	197	" 3 "
Pease	87	" 3 "
Sundries (flax, rye, spelt)	25	" 3 "
Potatoes	618	" 3 "
Tree seeds (maple and ash)	759	" ½ lb. each.
Shrub seeds (Caragana)	810	packets.
Grass seed, Brome	10	bags of 1 lb. each.
Grass seed, Western Rye	60	" 1 "
Small seeds, 545 bags containing 8,175 packages of shrub, flower, root and garden seeds and corn.		
Rhubarb roots	88	packages.
Fruit bushes	241	"
Tree and shrub seedlings	668	"
Express parcels, containing tree and shrub seedlings	130	parcels.

CORRESPONDENCE.

During the 12 months ending October 31, 1905, 7,820 letters, irrespective of reports on grain and other samples, were received, and 7,874 letters, not counting circulars of instruction sent with samples, were mailed from this office.

METEOROLOGICAL.

Month.	Temperature, Maximum.		Temperature, Minimum.		Rainfall.		Snow-fall.	Hours of Bright Sunshine.
1904.	Date.	Degrees	Date.	Degrees	Days.	Inches.	Inches.	
November	2	66	30	—13	.....	.....	3·75	114·4
December	30	39	26	—38	.....	.....	10·	66·8
1905.								
January	4	30	9 & 24	—34	.....	.....	2·5	97·9
February	27	51	4	—43	....	.....	4·5	139·2
March	21	63	12	—10	2	·26	6·5	153·6
April	26	79	10 & 17	10	2	·32	2·5	245·
May	31	78	4	16	10	3·34	2·	199·8
June	2 & 3	85	9 & 23	35	17	5·16	.....	169·1
July	13, 19, 20	80	22 & 24	42	15	2·47	.....	265·4
August	25	88	29	39	7	2·28	.....	264·
September	28	81	11 & 23	31	8	5·00	.....	179·2
October	3 & 5	73	19 & 27	9	3	·34	2·	90·9
					64	19·17	33·75	1,985·3

I have the honour to be, sir,

Your obedient servant,

ANGUS MACKAY,

Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF THOMAS A. SHARPE, SUPERINTENDENT.

AGASSIZ, B.C., November 30, 1905.

To Dr. WM. SAUNDERS, C.M.G.,
Director Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit the following report of the work done on the Experimental Farm at Agassiz during the year 1905.

The past year has in some respects been more or less unfavourable to fruits and to some classes of agricultural products. The first part of the year was very mild and fine, with a very light snowfall in January and none in February, while the lowest temperature recorded at this station in January was twelve degrees of frost on the 12th, and the lowest in February was twenty-four degrees on the 24th. March averaged colder than either of the two preceding months. There were several unusually cold periods, the coldest being nineteen degrees of frost on the 11th. Towards the end of the month, the weather became warmer and many of the fruit trees came out in bloom. During April the weather continued cool with frequent cold rains and several light frosts, which, occurring during the blossoming of the fruit trees or when the fruit was setting, caused a considerable loss in the strawberry, apple, cherry, plum and pear crops. The weather became warmer in May, but remained showery and in consequence the spraying of fruit trees for fungus diseases was not very effective, and plum rot was rather prevalent. In many instances the showers were followed by bright sunshine which favoured the development of fungus diseases in stone fruits and the cracking of the cherries.

After the middle of June the weather became dry and hot and the rainfall during July, August and the first half of September was very light. As much of the land on this farm is a loam more or less sandy or gravelly, underlaid with gravel it does not resist drought, and late crops such as mangels, turnips, &c., suffered. The heavy rains of the latter part of September and first half of October did some damage to late grain crops, which were not harvested, but on the whole the loss throughout the country has not been heavy, and practically nothing was lost from this cause on the experimental farm.

Some loss from the potato rot in low lands is reported, but up to the present time we have not suffered to any considerable extent from this disease. A severe frost on the nights of October 17 and 18 killed many tender plants and arrested the growth of mangels and sugar beets, and is reported to have done injury to potatoes yet undug or insufficiently protected. Such a frost is very unusual so early in the season, this being the first time in many years that a killing frost has occurred before the second week in November.

FRUIT CROPS.

The frost during the early spring cut down the strawberry crop one-third, it also lessened the plum and cherry crops and later on the brown rot and the cracking of the cherries caused by rain lessened the crop of these fruits. Pears and apples are in many places a light crop, but the bright clear summer and autumn favoured the de-

velopment of the fruit which remained, so that the sample is above the average in quality.

The hedges continue to be one of the attractions of the farm, and the addition of a few more would be appreciated, as giving a wider selection to those who are contemplating planting a hedge either for ornament or for the protection it would afford as a windbreak.

ORNAMENTAL TREES AND SHRUBS.

Almost all of the above description of trees and shrubs have done very well. The long continued dry north wind in February and March injured some of the evergreens, but a season's growth has effaced the injury and restored their beauty.

NUT TREES.

This class of trees and shrubs have made a very satisfactory growth, and for the first time since they were planted the filberts have been fairly productive.

The bluejays are very numerous and very destructive, beginning to pluck and carry off the filberts as soon as the nut has filled, and by the time the nut is ripened but few are left on the bushes.

The Japanese and Spanish chestnuts, and the Japanese walnuts again produced a fine crop. The English and black walnuts have each produced a few nuts. The shellbark hickory and butternut trees have also given a light crop, and the pecan trees blossomed, but have not yet fruited.

The nuts and tree seeds distributed in previous years have given good satisfaction, many reports having been received from different parts of the country giving accounts of fine growth, accompanied by inquiries for more seed. As many as possible of these applicants will be supplied from this year's crop.

DITCHING.

About 600 yards of ditch have been dug this year; part of this has been covered with split cedar and filled in, which makes a very satisfactory underdrain.

NEW BREAKING.

About three acres of new breaking has been done this year.

LIVE STOCK.

CATTLE.

All of the cattle now at this farm are registered Shorthorns, and the herd consists of 10 cows, 5 heifers and three heifer calves, one stud bull and six bull calves. Since my last report three bulls have been sold for breeding and one for beef, one barren cow for beef and two calves for veal.

SHEEP.

The sheep also are all pure bred, of the Dorset-horned breed, and the flock at present consists of 16 ewes and ewe lambs, and five males. Since my last report, one ewe and one ram died, two rams were sold for breeding and two ewes and four males sold to the butcher.

PIGS.

The pigs on hand are all pure bred Berkshires or Yorkshires. Quite a number of both breeds and of either sex have been sold throughout the province for breeders, and those unsuitable for this purpose have been fed and sold to the butcher. At

present there are three sows and one boar of the Berkshire breed, and four sows and a boar of the Yorkshire; all thrifty, fine animals.

HORSES.

Since my last report, one of the old horses has died, and one young horse also died, from inflammation of the bowels. A fine young team was bought last spring and another this autumn; all these are horses averaging about fifteen hundred lbs., and are very serviceable animals. A useful mare was also bought, weighing about 1,200 lbs., for a general purpose animal.

BEES.

Two swarms of bees died last winter which left five swarms when spring opened. These were hived during May and early June and all of these are apparently strong and well furnished with stores for the winter.

MOUNTAIN ORCHARDS.

The mountain orchards have been injured a good deal by wild animals, and some of the fruit has been taken off by bears and racoons. All the orchards bore some fruit this year, and some of the finest specimens we had were from trees over 800 feet above the level of the valley.

FOREST AND NUT TREES.

The nut and forest timber trees planted in the forestry plantation continue to make satisfactory growth, and many of those on the mountains while not growing so rapidly as in the cultivated lands in the valley, are making fair progress.

POULTRY.

The breeds kept this year on the farm were B. P. Rocks, Buff Orpingtons, Black Minorcas, White Wyandottes, Light Brahmas and S. C. Brown Leghorns.

The Leghorns laid the largest number of eggs. The Black Minorcas came next in number, but their eggs being so much larger, the balance of weight of eggs was in their favour. Of the heavier breeds the White Wyandottes are the best layers, B. P. Rocks the next, Buff Orpingtons and Brahmas are about equal. As table fowls the White Wyandottes mature the earliest. B. P. Rocks and Buff Orpingtons are larger at maturity, whereas the Brahmas, although taking a little longer to mature than any of the others, attain a larger size than any of the other breeds which we have.

One advantage which the Black Minorcas and Leghorns have over the heavier breeds in this wet climate is, that their feathers lie closer to their bodies and shed the rain better than some of the heavier fowls. The White Wyandottes of the heavier breeds come next in this respect.

The hens are kept in their breeding pens—which have a yard attached to each—from January 1 to July 1. During the rest of the year they are at large.

There has been no disease among the poultry this year, except a few cases of rheumatism owing to the wet weather, but we are very much troubled by crows, hawks and skunks which carry off a good many chickens even when they are well grown.

This year the chickens were hatched and reared by hens. The percentage hatched and raised has been about the same as was had by the use of an incubator and brooder in previous years. The advantage in the use of an incubator and brooder is in early chickens and a large number of chickens raised at one time.

The poultry were fed mixed grain—$\frac{1}{4}$ wheat, $\frac{1}{2}$ oats, $\frac{1}{4}$ pease, and in the autumn, sunflower seeds. During the coldest weather in winter they get once a day boiled roots mashed and mixed with a little chop of any kind on hand, and a cabbage head or some vegetable always before them.

The hen house is whitewashed several times during the summer. Nest-boxes and roosts are movable, so as to be easily cleaned. They are given clean chaff or straw once a week on a swept floor, then grain is thrown into this chaff or straw, and they have to scratch for it.

EXPERIMENTS WITH OATS.

The experimental plots of oats were on a loamy soil which had received a light dressing of manure on a clover sod in the autumn of 1903, and had been sown to roots in the summer of 1904. The land was in fine condition both as to fertility and tilth when the oats were sown, April 15. Forty varieties were sown in plots of one-fortieth of an acre each, and at the rate of two and a half bushels per acre. The seed germinated well and made an even stand, with promise of a heavy yield, until the rust appeared, in July. Some varieties suffered badly, others were but slightly injured, and in these latter cases the yield has been very fair. Golden Fleece, Siberian and Abundance, appeared to be the least affected of any, but the last two sorts were badly affected last year.

All the seed was treated with bluestone for the prevention of smut, and there was practically no smut in any of the plots.

OATS—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.		Weight per Bushel.	Rusted.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.	
1	Abundance	Aug.	3	110	46	Stiff	10	Branching	6,960	95	10	34	Slightly.
2	Golden Fleece	"	7	114	44	"	10	"	5,920	92	32	32	"
3	Siberian	"	4	111	42	"	9	"	7,760	91	26	35½	"
4	Improved American	"	7	114	46	"	9	"	5,840	82	22	34	Consid'ably.
5	Tartar King	"	2	109	40	"	10	Sided	7,160	81	6	36	"
6	Kendal White	"	7	114	44	"	10	"	5,360	80		33	"
7	Goldfinder	"	5	112	48	Medium	9	"	6,480	77	22	32½	"
8	Milford White	"	3	110	42	Strong	9	"	5,680	74	24	35½	"
9	Sensation	"	4	111	40	"	9	Branching	4,560	74	14	34½	Badly.
10	Waverley	"	8	115	46	"	10	"	5,920	74	4	33	Consid'ably.
11	Black Beauty	"	1	108	44	"	11	"	5,520	72	2	37½	"
12	Bavarian	"	9	116	46	"	10	"	5,840	70	20	32½	"
13	Storm King	"	1	108	48	"	10	Sided	6,560	69	14	34	Badly.
14	Joanette	"	2	109	40	Medium	10	Branching	5,880	68	8	33½	Consid'ably.
15	Golden Tartarian	"	9	116	46	Strong	9	Sided	4,920	67	32	31	"
16	Holstein Prolific	"	4	111	40	"	9	Branching	5,360	67	12	34	"
17	Mennonite	"	7	110	44	"	10	"	6,040	66	26	33	"
18	Lincoln	"	4	111	46	"	10	"	6,520	63	18	34	"
19	Thousand Dollar	"	7	114	42	"	9	"	5,640	63	8	34	"
20	Improved Ligowo	"	8	115	40	"	9	"	5,120	62	32	32	"
21	Danish Island	"	8	115	48	"	10	"	5,520	62	22	35	"
22	American Triumph	"	4	111	46	"	9	"	6,120	62	12	33	"
23	Swedish Select	"	4	111	46	Medium	9	"	5,480	61	4	33½	"
24	Banner	"	7	114	42	Strong	9	"	5,040	60	28	34	"
25	Olive Black	"	2	109	44	"	9	Sided	5,120	60	18	34	"
26	Milford Black	"	2	109	44	"	9	"	6,640	60	8	34	"
27	Kendal Black	"	3	110	40	"	10	"	5,040	59	32	34	"
28	Early Golden Prolific	"	3	110	40	Medium	9	Branching	5,400	59	2	32½	"
29	Wide Awake	"	7	114	44	"	9	"	5,840	58	26	32	Slightly.
30	White Giant	"	5	112	40	Strong	9	"	5,720	58	16	34	"
31	Columbus	"	8	115	40	Medium	9	"	5,760	58	6	33	Badly.
32	Pioneer	"	1	108	40	Strong	10	"	5,540	57	22	34¼	Consid'ably.
33	Irish Victor	"	4	111	46	"	10	"	6,440	57	2	33	Slightly.
34	American Beauty	"	4	111	46	"	11	"	5,520	56	16	32	Consid'ably.
35	Buckbee's Illinois	"	3	110	40	"	9	"	5,440	49	14	32½	"
36	Twentieth Century	"	3	110	44	Medium	10	"	5,640	49	4	32	"
37	Scotch Potato	"	5	112	40	Strong	10	"	5,440	48	28	32	"
38	Golden Giant	"	9	116	46	"	9	Sided	5,640	47	2	32	"
39	Golden Beauty	"	4	111	40	Medium	9	Branching	5,600	45	30	32½	Badly.
40	Swedish Probstey	"	2	109	48	Strong	10	"	5,840	43	18	34½	"

EXPERIMENTS WITH BARLEY.

Nineteen varieties of six-rowed barley, and fifteen of two-rowed were tested this year. The land selected for the barley plots was a light loam which was in clover in 1903; this received a light dressing of stable manure in the autumn of that year, when the clover, with the added manure, was turned under. It was planted with potatoes in 1904, and was in very good condition for grain in 1905. The plots were one-fortieth of an acre each, and the grain was sown on April 15, at the rate of two bushels per acre. The barley is very bright, but owing to the very hot weather which prevailed when the grain was in the dough stage, and which hastened the ripening, it is not as plump as it was in 1904. There was no smut on any of this grain.

SIX-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Nugent	July 29.	105	44	Strong	3	6,800	55	20	50½
2	Argyle	" 26.	102	42	"	3½	6,800	54	8	49⅝
3	Mensury	" 26.	102	46	"	3	6,400	53	6	46½
4	Brome	" 27.	103	42	"	3½	6,960	52	34	50
5	Albert	" 27.	103	42	"	2	6,600	52	24	51¾
6	Stella	" 29.	105	40	"	3	8,000	50	10	51¼
7	Oderbruch	" 27.	103	44	"	3	5,520	50	..	50¼
8	Blue Long Head	" 27.	103	40	"	2½	6,400	49	38	42
9	Yale	" 28.	104	42	"	2½	6,400	49	28	50
10	Empire	" 29.	105	44	"	3–4	6,440	49	28	50
11	Rennie's Improved	" 24	100	48	"	2½	5,520	49	8	53
12	Odessa	" 24.	100	45	"	3	5,400	48	16	50½
13	Common	" 27.	103	42	"	3	5,600	47	24	49½
14	Mansfield	" 29.	105	46	"	3	6,000	46	32	50
15	Champion	" 22.	98	46	"	3	7,000	45	40	45
16	Claude	" 26.	102	44	"	2½	5,400	45	20	51½
17	Royal	" 27.	103	44	"	3	5,440	44	8	51
18	Summit	Aug. 1	108	40	"	3	5,440	39	8	51
19	Trooper	" 1.	108	46	"	3	5,120	33	16	49½

TWO-ROWED BARLEY—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Newton	Aug. 5.	111	40	Strong	3	168	55	..	50½
2	Swedish Chevalier	" 2.	108	40	Medium	4	153	52	24	51⅓
3	Canadian Thorpe	" 3.	109	42	Strong	3	151	51	32	51⅓
4	Beaver	" 4.	110	39	Medium	4	167	51	12	52⅓
5	Invincible	" 4.	110	40	Strong	3	160	49	28	50
6	Standwell	" 5.	111	40	"	3	148	46	32	50½
7	French Chevalier	" 5.	111	40	"	4	158	46	22	51½
8	Clifford	July 31.	106	48	Very strong.	4½	156	42	24	51
9	Harvey	Aug. 1.	107	46	Strong	4	148	41	32	49½
10	Sidney	" 3.	109	38	"	3–4	136	39	8	51
11	Jarvis	" 5.	111	40	"	3	138	37	34	49
12	Dunham	" 4.	110	42	"	4	146	36	12	50
13	Danish Chevalier	" 5.	111	38	Medium	4	140	35	40	50½
14	Gordon	" 5.	111	40	"	4	123	29	8	51
15	Logan	" 4.	110	40	Strong	3–4	118	25	40	48½

EXPERIMENTS WITH FALL WHEAT.

Seven varieties of fall wheat were sown on October 15, 1904. The land where these were sown is a sandy or gravelly loam, which had clover stubble turned under in the summer, after which the land was harrowed once a week, until the seed was sown. The plots were one-fortieth of an acre each, and the seed was sown at the rate of one and a half bushels per acre. Six of the varieties came through the winter and gave a fair yield, but the variety known as Choice Club was so completely winter killed that not half a dozen plants were left in the spring. There was no rust or smut on any of these plots.

FALL WHEAT—TEST OF VARIETIES.

Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Abundance	Oct. 15.	July 18.	276	46	Stiff.. ..	3½	Beardless.	4,800	33	20	65
Turkey Red	" 15.	" 19.	277	40	"	4	Bearded..	5,700	32	40	65
American Banner	" 15.	" 15.	273	46	"	3	Beardless.	5,000	32	20	63⅔
Kharkov	" 15.	" 18.	276	44	"	2½	Bearded..	4,800	32	..	65⅕
Dawson's Golden Chaff	" 15.	" 17.	275	44	"	3½	Beardless.	4,480	29	20	63½
Red Velvet Chaff	" 15.	" 19.	277	44	"	4	" .	5,210	27	20	64½
Choice Club	" 15.	Winter	killed.								

EXPERIMENTS WITH SPRING WHEAT.

Twenty-eight varieties of spring wheat were sown in plots of one-fortieth of an acre each. The previous crop was clover, which was cut in June of 1904 and the after-growth turned under in September and cut with the disc and harrowed to rot the sod. Sown April 18 at the rate of ninety pounds of seed per acre, the stand was uniform, the growth vigorous and the heads long, but a bad attack of midge nearly destroyed the crop. The spring wheat over most of the lower Fraser valley was so badly injured by this pest that many fields were not cut, but were harvested by pigs. Fortunately, spring wheat is not very much grown in that part of the province. There was no rust on any of these plots.

SPRING WHEAT—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
				In.		In.		Lbs.	Bush.	Lbs.	Lbs.
1	Hungarian White	Aug. 14	118	40	Strong	3	Bearded	4,960	16	..	57
2	Monarch	" 14	118	47	"	4½	Beardless.	4,840	15	20	57
3	Herisson Bearded	" 12	116	48	"	2	Bearded	5,200	14	..	59¼
4	Chester	" 15	119	44	"	3	Beardless.	5,600	13	20	58
5	Countess	" 14	118	46	"	3	"	5,560	12	50	57
6	White Russian	" 15	119	48	"	4	"	5,280	12	40	57¾
7	Dawn	" 14	118	46	"	4	"	4,800	12	20	57½
8	Stanley	" 16	120	46	"	3½	"	4,400	11	20	57
9	Wellman's Fife	" 16	120	48	"	3½	"	4,800	11	10	58¼
10	Early Riga	" 10	114	38	Weak	2½	"	4,840	11	..	60
11	Red Fern	" 15	119	40	Medium	3	Bearded	5,360	10	40	60
12	Australian No. 9	" 15	119	48	Strong	4	Beardless.	4,920	10	30	55⅓
13	Minnesota No. 163	" 24	128	48	"	3½	"	4,720	10	20	58¾
14	Laurel	" 14	118	46	"	3	"	4,920	10	..	56
15	McKendry's Fife	" 16	120	40	"	4	"	4,800	9	50	58
16	Colorado	" 12	116	49	"	3½	Bearded	4,960	9	40	57
17	Advance	" 14	118	46	"	3	"	4,720	9	30	56
18	Bishop	" 14	118	46	"	3	Beardless.	5,560	9	20	56
19	Weldon	" 21	125	48	"	3½	"	5,120	9	10	56
20	Red Fife	" 16	120	46	"	3	"	5,120	9	..	57
21	White Fife	" 16	120	42	Medium	3	"	4,560	8	50	58¼
22	Clyde	" 18	122	50	Strong	4	"	4,640	8	30	55
23	Huron	" 12	116	46	"	3	Bearded	4,560	8	20	57½
24	Haynes' Blue Stem	" 16	120	49	"	3½	Beardless.	5,440	8	10	54
25	Percy	" 12	116	46	"	3	"	4,880	7	20	57
26	Power's Fife	" 18	122	46	"	4	"	4,640	5	50	56
27	Pringle's Champlain	" 17	121	50	"	4	Bearded	4,320	5	40	56
28	Preston	" 5	109	48	"	4	"	5,360	5	20	58½

MACARONI WHEATS.

Four varieties were sown alongside of the spring wheats in plots of one-fortieth of an acre each. They were sown on April 18, seed being used in the proportion of one and a-half bushels per acre. The injury from the midge in these varieties appears to be as serious as it is to the ordinary milling wheats. There was no rust on any of these plots.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Tons Lbs.	Bush.	Lbs.	Lbs.
Yellow Gharnovka	Aug. 5	119	42	Medium	3	Bearded	3 160	12	..	60
Goose	" 12	116	48	Strong	3½	"	2 1,040	11	..	57
Roumanian	" 14	118	47	"	3½	"	2 1,340	8	40	57½
Mahmoudi	" 16	120	48	"	3½	"	2 1,360	8	..	57

EMMER AND SPELT.

Two varieties of Emmer and two of Spelt were sown this year on April 18 in plots one-fortieth of an acre each. These were sown alongside of the spring wheats, but have not suffered very much from the midge. Many samples of these varieties have been distributed throughout the provinces for test, especially in the interior, but they do not appear to gain popularity and are seldom asked for a second time.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
			In.		In.		Tons Lbs.	Lbs.
White Spelt	Aug. 14	118	38	Strong	5	Beardless.	2 1,720	1,960
Common Emmer	" 14	118	38	Weak	2	Bearded	2 1,360	1,840
Red Spelt	" 12	116	40	Strong	3½	Beardless.	2 1,820	1,510
Red Emmer	" 14	118	38	"	3	Bearded	2 1,840	1,480

FALL RYE.

Four varieties of fall rye were sown on October 15 alongside of the fall wheats in plots of similar size and grown under like conditions. The variety known as Thousand Fold gave the heaviest crop. There was no rust or smut on the grain in any of these plots. The seed was sown at the rate of ninety pounds per acre.

Name of Variety.	Date of Ripening.	No. of days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.		Weight per Bushel.
			In.		In.		Lbs.	Bush.	Lbs.	Lbs.
Thousand Fold	July 20	278	60	Stiff	6½	Bearded	7,600	47	48	60
Mammoth White	" 20	278	70	"	6	"	8,800	46	24	58⅔
Giant	" 22	280	66	"	6	"	8,200	44	16	60⅔
Emerald	" 19	277	60	"	6	"	7,200	42	8	59

EXPERIMENTS WITH PEASE.

Thirty varieties of pease were tested. They were sown on a gravelly loam on a clover sod which was ploughed in November of 1904 and repeatedly harrowed in March and April before sowing. The pease were sown on plots of one-fortieth of an acre each on April 18 in the proportion of two bushels of the small sorts and three bushels of the larger pease per acre. The straw of all the varieties was clean and bright. As will be seen by the following table the yields are fairly good in all cases, and the grain was plump and very fine.

PEASE—TEST OF VARIETIES.

Number.	Name of Variety.	Date of Ripening.	Number of days maturing.	Character of Growth.	Length of Straw.	Weight of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.		Weight per Bushel.
					In.	Lbs.	In.		Bush.	Lbs.	Lbs.
1	Paragon	Aug. 14	118	Strong	60-64	6,640	3	Medium	50	..	65
2	English Grey	" 4	108	"	54-58	6,720	3	"	50	..	61½
3	German White	" 8	112	"	50-52	5,560	2½	"	48	40	65
4	Chancellor	" 15	119	"	48-52	5,840	3	"	48	40	64
5	Early Britain	" 7	111	"	50-52	5,720	3	"	47	20	63
6	Crown	" 15	119	"	50-54	5,840	2⅓	Small	46	..	64½
7	White Marrowfat	" 10	114	"	42-48	5,560	2½	Large	43	40	64
8	Gregory	" 8	112	"	50-52	6,160	2½	Medium	43	20	65
9	Macoun	" 11	115	"	54-60	6,640	2½	Large	43	10	64¾
10	Golden Vine	" 11	115	"	58-60	5,400	2½	Small	42	40	65
11	Victoria	" 10	114	"	50-54	5,760	3	Medium	42	20	64½
12	Mackay	" 12	116	"	56-60	5,840	2½	"	42	10	65¼
13	White Wonder	" 10	114	"	60-64	6,480	3	"	42	10	65¼
14	Arthur	" 10	114	"	48-50	5,360	2	Large	41	30	64½
15	Carleton	" 7	111	"	65-70	6,720	2⅓	Medium	41	20	65
16	Prince	" 12	116	"	36-42	5,640	2½	Large	41	10	64½
17	Black-eyed Marrowfat	" 12	116	"	50-54	5,280	3	"	41	..	65
18	Mummy	" 7	111	"	48-52	6,360	2⅓	Medium	40	40	63¾
19	Agnes	" 14	118	"	56-60	6,440	2½	Large	40	30	65½
20	Duke	" 19	123	"	54-58	5,960	2⅓	"	39	20	64½
21	Archer	" 9	113	"	48-52	5,840	2⅓	Medium	39	20	62½
22	Prince Albert	" 11	115	Medium	46-50	6,080	2½	Small	38	30	65¼
23	Wisconsin Blue	" 7	111	Strong	50-56	5,680	2⅓	"	36	20	65
24	Pride	" 8	112	"	56-60	5,520	2½	Large	36	10	64
25	Nelson	" 12	116	Medium	48-50	6,120	3	Medium	35	40	64½
26	Daniel O'Rourke	" 4	108	Strong	52-58	6,720	2	Small	35	20	65
27	Picton	" 10	114	"	50-54	5,840	3	Medium	34	..	65
28	Kent	" 9	113	"	50-52	5,240	2½	Large	28	40	64
29	Prussian Blue	" 8	112	"	44-48	5,840	2½	Medium	28	..	65½
30	Pearl	" 10	114	"	72-76	5,280	2½	Large	26	40	65¼

INDIAN CORN.

Twenty-one varieties of Indian corn were grown for ensilage, in rows three feet apart on a loamy soil. The cold wet spring retarded the growth. The dry hot weather in July and August with constant cultivation kept it growing fast, but the weights of crop are not equal to previous years, and in many cases the ears formed were very small and the grain quite immature.

The yield has been calculated from the weight of crop grown on two rows each 66 feet long.

The test of corn sown at different distances apart was repeated this year. As in previous years, the crop was more matured and in better condition where the rows were wide apart, allowing the sun and air to have their full beneficial effect.

CORN—TEST OF VARIETIES.

Number.	Name of Variety.	Character of Growth.	When Tasselled.	In Silk.	Early Milk.	Condition when Cut.	Weight per Acre grown in rows.		Weight per Acre grown in hills.	
							Tons.	Lbs.	Tons.	Lbs.
1	Pride of the North	Very strong.	Aug. 18	Sept. 4	Sept. 24	Early milk..	29	1,620	25	160
2	Thoroughbred White Flint	"	" 28	" 20	... .	In silk.....	22	1,210	26	800
3	White Cap Yellow Dent	"	" 20	" 6	Sept. 24	Early milk..	22	880	21	240
4	Giant Prolific Ensilage	"	" 26	" 20	.....	Ears formed	22	440	18	1,840
5	Mammoth Cuban	"	" 22	" 10	Sept. 20	Early milk..	21	1,560	20	1,800
6	Compton's Early	"	" 10	Aug. 30	" 6	Late milk...	20	1,580	20	1,800
7	Early Butler	"	" 16	" 30	" 14	Early milk..	20	700	17	1,310
8	Red Cob Ensilage	"	" 14	" 28	" 4	Late milk...	19	1,600	19	940
9	Champion White Pearl	"	" 8	" 22	" 6	" ...	19	940	17	1,200
10	Superior Fodder	"	" 20	Sept. 6	.....	Ears formed	19	720	24	1,280
11	Longfellow	"	" 12	" 4	Sept. 20	Roasting ear	18	960	18	1,180
12	North Dakota White	"	" 18	" 2	" 26	Early milk..	18	80	17	540
13	Salzer's All Gold	"	" 24	" 20	... .	In silk.....	17	1,860	17	210
14	Northern Dent	"	" 18	" 6	Sept. 24	Early milk..	16	1,880	14	1,810
15	Early Mastodon	"	" 20	" 8	" 26	" ..	16	1,000	16	1,770
16	King Philip	"	" 16	" 2	" 22	Roasting ear	16	780	15	1,990
17	Eureka	Strong.....	" 14	" 14	.....	In silk.....	15	1,900	15	910
18	Cloud's Early Yellow	"	" 12	Aug. 28	Sept. 20	Early milk..	14	160	13	620
19	Selected Leaming	"	" 16	" 28	" 22	" ..	13	1,060	15	360
20	Angel of Midnight	"	" 18	" 28	" 20	" ..	13	840	15	1,460
21	Evergreen Sugar	"	" 20	" 28	" 14	" ..	12	860	12	220

CORN SOWN AT DIFFERENT DISTANCES APART.

Name of Variety.	Date of Sowing.	Character of Growth.	Distance in rows.	Distance in hills.	Condition when cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
			In.	In.		Tons.	Lbs.	Tons.	Lbs.
Champion White Pearl	April 18	Strong.....	21	21	Early milk..	28	380	26	991
" "	" 18	"	28	28	" ..	21	1,560	22	830
" "	" 18	"	35	35	Late milk...	19	67	18	311
" "	" 18	"	42	42	" ..	17	410	15	265
Longfellow	" 18	"	21	21	Early milk..	21	618	21	1,182
"	" 18	"	28	28	" ..	17	837	16	1,530
"	" 18	"	35	35	Late milk...	17	343	16	1,603
"	" 18	"	42	42	" ..	14	1,134	13	1,437
Selected Leaming	" 18	"	21	21	Early milk..	18	1,311	17	696
"	" 18	"	28	28	" ..	14	285	14	1,418
"	" 18	"	35	35	" ..	13	136	12	906
"	" 18	"	42	42	Late milk...	10	648	9	1,988

EXPERIMENTS WITH FIELD ROOTS.

The land for the root crop was in clover in 1903 and two heavy crops were cut that summer, and a heavy aftermath turned under in November. A dressing of stable manure was given during the fall and winter, and mixed oats and peas sown in the spring of 1904 along with about ten lbs. of clover seed. The oat crop was a fairly good one and there was a splendid catch of clover to which was added a light dressing of stable manure in the fall and the whole turned under in December, 1904. Early in March, 1905, the harrow and disc were started, and these were used alternately every week until the seed was sown. The first plots of sugar beets, carrots and mangels were sown on April 12, and the second series of plots two weeks later, April 26, and

both lots of all the varieties were pulled October 27 and 30. The first plots of turnips were sown May 15, and the second series on May 29, and both were pulled October 30.

The cold wet weather of April and May prevented a free germination of the seed, and in every case the stand was uneven, and the plants did not begin to grow vigorously until well on in June. The lack of rain in the latter part of that month and during July and August prevented a large yield. The yields per acre in all cases have been calculated from the weights of roots obtained from two rows each sixty-six feet long.

TURNIPS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Magnum Bonum	20	1,184	686	24	18	168	602	48
2	Carter's Elephant	20	656	677	36	17	1,772	596	12
3	Hartley's Bronze	19	808	646	48	..	..	..	..
4	Hall's Westbury	18	1,752	629	12	20	1,448	690	48
5	Mammoth Clyde	18	1,488	624	48	18	432	607	12
6	Selected Purple Top	18	1,356	622	36	17	716	587	36
7	Imperial Swede	18	36	600	36	14	248	670	48
8	East Lothian	17	1,112	585	12	16	1,132	552	12
9	Jumbo	17	716	578	36	14	968	481	48
10	New Century	17	584	576	24	15	888	514	48
11	Kangaroo	16	736	546	36	15	492	508	12
12	Skirvings'	16	76	534	36	18	36	600	36
13	Elephant's Master	16	76	534	36	13	1,852	464	12
14	Good Luck	15	1,812	530	12	21	1,296	721	36
15	Bangholm Selected	15	1,680	528	..	14	776	479	36
16	Perfection Swede	15	1,548	525	48	19	148	635	48
17	Sutton's Champion	15	492	508	12	17	1,112	585	12
18	Halewood's Bronze Top	14	1,430	490	36	18	828	613	48
19	Emperor Swede	14	512	475	12	16	736	545	36
20	Drummond Purple Top	12	228	404	48	12	1,872	431	12

MANGELS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre.							
		1st Plot.				2nd Plot.			
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Giant Sugar Mange	26	800	880	..	20	1,976	699	36
2	Prize Mammoth Long Red	24	180	803	..	20	1,448	690	48
3	Lion Yellow Intermediate	23	1,916	798	36	19	808	646	48
4	Selected Yellow Globe	22	1,936	765	36	21	372	706	12
5	Leviathan Long Red	22	1,934	765	36	20	1,316	688	36
6	Gate Post	20	1,712	695	12	21	636	710	36
7	Giant Yellow Globe	20	1,580	676	20	16	472	541	12
8	Ideal	20	656	677	36	19	1,600	660	..
9	Half Long Sugar White	18	1,884	631	24	18	1,224	620	24
10	Giant Yellow Intermediate	18	1,752	629	12	15	1,940	532	24
11	Yellow Intermediate	18	1,660	627	..	19	676	644	36
12	Selected Mammoth Long Red	18	1,588	626	28	15	1,152	519	12
13	Half Long Sugar Rosy	16	736	545	36	13	1,984	466	24
14	Mammoth Long Red	16	76	534	36	15	492	508	12
15	Mammoth Yellow Intermediate	15	624	510	24	14	116	468	36
16	Triumph Yellow Globe	13	664	444	24	12	1,608	426	48
17	Prize Winner Yellow Globe	12	1,872	431	12	13	268	437	48

CARROTS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Mammoth White Intermediate	28	1,585	959	45	26	1,130	885	30
2	Improved Short White	27	1,770	929	30	26	1,790	896	30
3	Ontario Champion	25	1,810	863	30	22	1,045	750	45
4	Long Yellow Stump Rooted	25	1,480	858	..	25	160	836	..
5	New White Intermediate	24	1,830	830	30	23	365	772	45
6	Carter's Orange Giant	23	1,520	792	..	20	1,745	694	..
7	Early Gem	23	860	781	..	21	1,395	723	15
8	White Belgian	23	35	767	15	21	390	706	10
9	Giant White Vosges	18	1,620	627	..	17	485	574	45
10	Half-long Chantenay	17	1,300	588	20	16	1,660	561	..
11	Kos Kirches	13	1,885	464	45	13	565	442	45

SUGAR BEETS—TEST OF VARIETIES.

Number.	Name of Variety.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Royal Giant	22	88	734	48	20	1,976	699	36
2	Improved Imperial	17	848	580	48	15	1,548	525	48
3	Red Top Sugar	16	76	531	36	14	644	477	24
4	Vilmorin's Improved	15	492	508	12	14	1,832	497	12
5	Wanzleben	13	928	448	48	12	156	402	36
6	French Very Rich	13	136	435	36	11	1,232	387	12
7	Danish Improved	12	24	400	24	13	4	433	24
8	Danish Red Top	9	216	303	36	8	368	272	48

EXPERIMENTS WITH POTATOES.

Forty-four varieties of potatoes were tested this year. The soil was a sandy loam, which had a crop of vetches turned under in the spring of 1904, and was planted with corn in the spring of 1904, receiving also a dressing of farm manure.

The corn was a fair crop, and as soon as it was cut in September the stubble was turned under and another light dressing of strawy manure spread over it and worked into the soil with the spading harrow. It was repeatedly harrowed with the spade and spike tooth harrows during March and April, and when the potatoes were planted on April 29 the weed seeds near the surface had been fairly well sprouted and destroyed. The potatoes were sprayed twice with bordeaux in July and the tops matured without appearance of blight, some varieties being quite green when they were dug September 22. The season was too dry for such a light sandy soil, but the yields were fairly good and the quality of the tubers excellent.

The yield has been calculated in each case from the weight of tubers dug from two rows each sixty-six feet long.

POTATOES—TEST OF VARIETIES.

Number.	Name of Variety.	Total Yield per Acre.	Yield per Acre of Sound.	Yield per Acre of Rotten.	Yield per Acre of Marketable.	Yield per Acre of Unmarketable.	Form and Colour.
		Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	Bush. Lbs.	
1	Late Puritan	699 36	664 ..	35 36	600 ..	64 ..	Long, white.
2	Empire State	673 12	640 ..	33 12	575 ..	65 ..	Long, flat, white.
3	Dooley	655 36	655 36	None	560 ..	95 ..	Oblong, white.
4	American Giant	646 40	646 40	"	616 40	30 ..	"
5	American Wonder	629 12	315 ..	314 12	269 .	46 ..	"
6	Seedling No. 7	624 48	624 48	None	559 48	65 ..	Long, red.
7	Daniel's Sensation	611 36	611 36	"	551 30	60 ..	Flat, white.
8	Dreer's Standard	607 12	607 12	"	522 12	85 ..	Long, white.
9	Uncle Sam	580 48	555 48	25 ..	480 48	75 ..	Round, white.
10	Dakota Red	578 36	578 36	None	518 36	60 ..	Long, red.
11	Carman No. 1	567 36	537 36	30 ..	483 36	54 ..	Round, white.
12	Vermont Gold Coin	563 12	533 12	30 ..	478 12	55 ..	Long, white.
13	Sutton's Invincible	561 ..	536 ..	25 ..	476 ..	50 ..	Oblong, white.
14	Enormous	556 36	556 36	None	551 ..	55 36	Long, flat, whlte.
15	Country Gentleman	545 36	545 36	"	495 36	50 ..	Oblong, pink.
16	Early St. George	536 48	536 48	"	456 48	80 ..	"
17	Rose No. 9	532 24	532 24	"	456 ..	76 24	Oblong, red.
18	I.X.L	528 ..	528 ..	"	422 30	105 30	Long, flat, pink.
19	Irish Cobbler	523 36	523 36	"	445 36	78 ..	Round, white.
20	Reeve's Rose	523 36	523 36	"	443 36	80 ..	Long, rose.
21	State of Maine	523 36	500 ..	23 36	450 ..	50 ..	Long, pink.
22	Bovee	519 12	508 12	11 ..	408 12	100 ..	Long, rose.
23	Carman No. 3	514 48	514 48	None	409 48	105 ..	Round, white.
24	Maule's Thoroughbred	484 ..	466 ..	18 ..	371 ..	95 ..	Long, rose.
25	Sabean's Elephant	484 ..	484 ..	None	427 ..	57 ..	Long, white.
26	Pearce	475 12	466 12	9 ..	406 12	60 ..	Long, red.
27	Penn Manor	466 24	448 ..	18 24	355 ..	93 ..	"
28	Morgan Seedling	466 24	446 ..	20 24	356 ..	90 ..	Long, pink.
29	Early White Prize	462 ..	462 ..	None	393 ..	69 ..	Long, white.
30	Holborn Abundance	457 36	435 ..	22 36	321 ..	114 ..	Round, white.
31	Delaware	448 48	448 48	None	374 48	74 ..	Long, white.
32	Money Maker	431 12	431 12	"	349 12	82 ..	"
33	Cambridge Russet	409 12	385 12	24 ..	344 ..	41 12	Long, flat, russet.
34	Vick's Extra Early	404 48	404 48	None	324 ..	80 48	Round, rose.
35	Early Andes	396 ..	396 ..	None	297 ..	99 ..	"
36	Rochester Rose	391 36	391 36	"	333 36	58 ..	Long, rose.
37	Sutton's Supreme	387 12	387 12	"	331 ..	56 12	Oblong, rose.
38	Burnaby Mammoth	374 ..	359 ..	15 ..	284 ..	75 ..	"
39	Canadian Beauty	352 ..	338 ..	14 ..	268 ..	70 ..	Obl'ng, flat, white
40	Early Rose	330 ..	330 ..	None	267 ..	66 ..	Oblong, rose.
41	Swiss Snowflake	312 24	302 24	10 ..	265 ..	37 24	" white.
42	Everett	296 24	281 24	15 ..	211 24	70 ..	" red.
43	Pingree	228 48	212 48	16 ..	178 ..	45 48	" white.
44	Early Envoy	211 12	211 12	None	171 12	40 ..	" pinkand white.

FODDER PLANTS.

The following forage plants were sown May 1 in plots of one-fortieth of an acre each.

As in previous years the millets are not very successful when compared with any of the mixtures of the common grains.

Plots one to six were sown May 1 and cut September 28 and 29.

Millets—

Plot 1.—White rounde.—Stalks, 18 to 24 inches, not leafy; heads 2 to 2½ inches long. Yield when cut, 2 tons 1,430 lbs. per acre.

Plot 2, Hungarian grass, stalks, 18 to 26 inches long, heads 2 to 4 inches, an even stand, but short. Weight when cut, 2 tons 960 lbs. per acre.

Plot 3.—Italian, a thin poor stand, stalks, 22 to 28 inches long; heads, 4 to 5 inches long. Weight when cut, 2 tons 1,320 lbs. per acre.

Plot 4.—Green Californian, stalks, 14 to 22 inches long, quite leafy; heads short and poor. Weight when cut, 1 ton 1,860 lbs. per acre.

Plot 5.—Algerian, stalks, 22 to 28 inches long, quite leafy; heads 3 to 5 inches long; a very thin stand. Weight when cut, 1 ton 1,910 lbs. per acre.

Plot 6.—Pearl, a poor stand; stalks, 26 to 36 inches long, not leafy; heads 1½ to 2 inches long. Weight when cut, 1 ton 780 lbs. per acre.

Plot 7.—Soja Beans, sown May 1 and cut September 29; drills 21 inches apart, an even stand, but not as leafy nor as well podded as in previous years; length of stalk, 24 inches and of pod 1 to 1¼ inches, not well branched. Weight when cut, 4 tons 640 lbs. per acre.

Plot 8.—Soja beans sown in drills 28 inches apart; sown May 1 and cut September 29. Stalks 28 to 30 inches long, fairly well branched and well podded; weight when cut, 4 tons 1,360 lbs. per acre.

Plot 9.—Soja beans sown 35 inches apart, very branching and leafy; pods 1 to 1¼ inches long and well filled with beans, commencing to harden when cut; weight, 4 tons 840 lbs. per acre.

SUNFLOWERS.

A quarter of an acre was sown in drills three feet apart and thinned to six inches in the drill. They made an even stand and grew from 6 to 8 feet high, with medium large heads.

CLOVER VERSUS CORN FOR ENSILAGE.

In this climate where clover grows so remarkably well and where early June weather is as a rule very wet, clover is a much safer crop if put into the silo than if cured for hay. The results of a test were given in my report for last year. This year the test was repeated on a heavier piece of land that has been under cultivation since shortly after the farm was opened, and was in better condition, and as a consequence the dry autumn has not had such an effect as it did on the clover last year, there being not only a good second crop, but a fairly heavy third crop, which was cut for feed during the last half of September. The results are as follows:—

First crop cut on June 5, 6 and 7 and weighed as taken from the field with no rain or dew on it. The second crop was cut July 20 and 21, and the third crop was cut from Sept. 16 and fed as needed. This land is a sandy loam underlaid with gravel, and clover sod has been turned under repeatedly in the last twelve years, making the top six inches fairly rich in humus, and thus well adapted to carry a crop successfully over a moderate drouth:—

	Tons.	Lbs.
The first cutting yielded	14	1,160
The second "	11	1,950
The third "	6	480
	32	1,590

This makes a better yield than our heaviest corn crop and at a very much cheaper rate per ton, as there is much less cost handling the clover from the beginning until it is safely in the silo. No cultivation is necessary during the spring or summer and no special machinery is required to put the clover into the silo as is the case with corn.

CLOVER EXPERIMENTS.

So much attention has been called to the necessity or usefulness of treatment of clover and alfalfa seed with special cultures of bacteria that it was thought desirable that an experiment be tried with seed treated and untreated of common red clover and alfalfa.

A quantity of seed of these legumes, both treated and untreated, was received from the Central Experimental Farm, for a test of this nature on the soil of this farm. The land chosen for this test has been under cultivation since 1894 and has been dressed several times with barnyard manure and has had after-growth of red clover turned under five times. The last time was in the fall of 1903, when a heavy growth of clover was turned under and a dressing of about ten tons per acre of farm yard manure applied during the winter following and thoroughly worked into the soil in spring and a crop of roots raised in 1904.

The land was lightly ploughed and harrowed early this spring and a half acre was seeded with inoculated alfalfa seed at the rate of twenty-five lbs. per acre, and the adjoining half acre sown with untreated seed at the same rate. Adjoining plots of half an acre each were sown with treated and untreated red clover at the rate of 12 lbs. per acre. A half bushel of barley per acre was sown broadcast at the same time, not as a nurse crop, but to be useful as a guide to the mower, and the plots were clipped off several times during the summer, the clippings being left as a mulch.

The growth has been very good on all the plots, but up to the present time no difference is apparent, which in the case of the red clover is quite natural as clover has always done remarkably well on this field.

Another season will perhaps show what effect the culture has on the alfalfa, which has failed on two previous occasions.

SUMMARY OF CROPS.

	Tons.	Lbs.
Hay	47	500
Clover in silo	67	1,300
Corn in silo	33	1,100
Turnips	38	1,600
Carrots	5	200
Mangels	4	1,600
Potatoes	6	280
Wheat	..	587

GARDEN VEGETABLES.

BEETS.—Sown April 4.

Early Blood Turnip. Fit for table, July 5. Crisp, sweet, fine flavoured; dark red.

Egyptian. Fit for table, July 5. An even, rapid grower; crisp, fine flavour; dark red.

Nutting's Dwarf Improved. Fit for table, July 10. Fine grained; good quality.

Long Smooth Blood Red. Fit for table September. Very fine quality; sweet, crisp; a good keeper.

BEANS.—Sown April 14.

Dwarf Golden Skinless. Fit for table, July 10. Very productive; pods from 2½ to 4 inches; crisp; good quality.

Dwarf Extra Early. Fit for table, July 10. Pods 2 to 4 inches; crisp; tender; good quality.

Dwarf Matchless. Fit for table, July 13. Productive; pods 3 to 5 inches; crisp; fine flavour.

Fame of Vitry. Fit for table, July 17. Strong grower; productive; pods 4 to 6 inches long; crisp; tender, good.

Dwarf Emperor of Russia. Fit for table, July 17. Bushy, strong grower; pods 4 to 5 inches; very productive; crisp, fine flavour.

Dwarf Black Speckled. Fit for table, July 20. Bushy; productive; pods 4 to 6 inches; crisp, juicy, good.

Parsnips.—Sown April 4.

Round Parsnips. Productive; very good quality.

Maltese. Tender; fine grained, good quality.

Garden Pease.—Sown April 10.

American Wonder. Fit for table, June 18. Pods long and well filled; sweet, fine flavoured, productive.

Nott's Exclesior. Fit for table, June 22. Productive; good quality.

Cabbage.

The seed was sown in beds in open ground April 4, and the plants were set out on May 25. All of the plants grew and headed well. Notwithstanding the hot, dry weather, but when the wet weather came in September, very many heads burst, and some began to grow again.

Paris Market. Fit for use, July 15. Heads medium size, firm, good.

Express. Fit for use July 15. Heads small; medium solid; crisp; fine flavoured.

Early Jersey Wakefield, July 18. Heads medium sized; solid; crisp, good.

Extra Early Midsummer Savoy. Fit for use, July 20. Heads medium; rather open; good quality.

Early Winnigstadt. Fit for use, August 14. Heads not very solid, but quality good.

Green Globe Savoy. Fit for use, September 5. Heads medium sized; solid; good quality.

Fottler's Improved Brunswick. Fit for use, October 3. Heads large, solid, crisp, good.

Cauliflower.

Early Snowball. Fit for use, July 25. Heads large, firm, very good.

Broccoli.

Extra Early White. Fit for table, August 20. Heads large, firm; delicate flavour.

Brussels Sprouts.

Improved Dwarf; vigorous growth; tender, good.

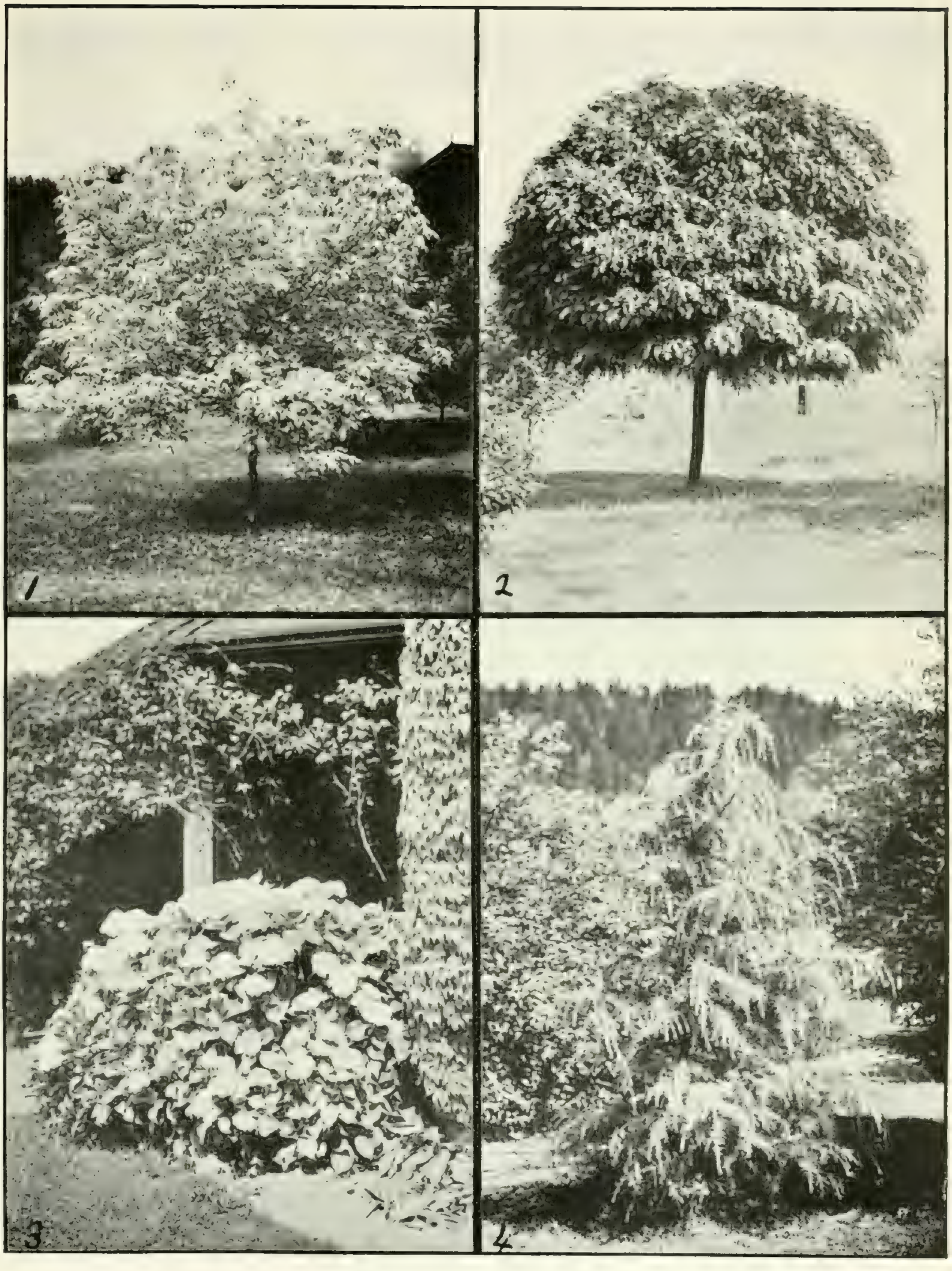


Photo. by C. E. Saunders.

1.—Variegated Negundo Maple.
2.—Crown Acacia.
3.—Hydrangea, Blue.
4.—Deodar Cedar.

RADISHES.—Sown April 5.

Early Scarlet Turnip. Fit for use, May 3. Crisp, good.
Olive Shaped Scarlet. Fit for use, May 7. Crisp, good.
Scarlet White-tipped Turnip. Fit for use, May 8. Crisp, very good.

LETTUCE.—Sown April 9.

Paris White Cos. Fit for table, May 15. Tender; crisp, fine flavoured.

CABBAGE LETTUCE.

All the Year Round. Fit for table, May 25. Tender, crisp, very good quality.

TABLE CARROTS.—Sown April 4.

French Horn. Fit for table, June 4. Crisp, good quality.
Luc Half Long. Fit for table, July 2. Very good.
Long Blood Red. Fit for table, July 8. Crisp, good.

TABLE TURNIPS.—Sown April 4.

Extra Early White Milan. Fit for table, June 5. A rapid grower; crisp; very good.

Early Stone. Fit for table June 8. Crisp; sweet, good.

Early White Strap-leaved. Fit for table, June 10. Crisp, good.

Yellow Robertson's Golden Ball. Fit for table, June 12. Fine flavour; very good.

ONIONS.—Sown April 4.

Large Red Weathersfield. Solid; fine grained; productive; a good keeper.

Trebon. Large, mild; a little inclined to make thick necks.

Market Favourite. Medium in size; thin skinned; very good.

Paris Silver Skin. Small, medium; thin skinned; mild flavoured; a good keeper; productive.

PUMPKINS.

Winter Luxury. Small; russet orange colour; medium deep fine grained flesh; productive, a good keeper.

Jonathan. Small; solid, meaty; good quality; good keeper, but not productive.

Japan Crookneck pumpkin. Five inches by 9 inches; green and orange; not of much account.

Mammoth King. Large, oblate; 12 to 14 inches from stem to blossom; 20 to 24 inches in diameter; flesh 2 inches thick, rich orange; moderately productive.

New Japanese Pie. Five inches from stem to blossom; 12 to 14 inches in diameter; fairly solid; good quality.

Nantucket or Negro. Large, oblong; solid, deep fleshed; fair quality.

Calhoun. Small, oblate; bright orange; flesh deep; fair quality; good keeper, but not productive.

Grey Mammoth. Very large, oblong; greyish green; solid; heavy; not productive.

Large Yellow Field. Large, oblong; solid; good quality; a good keeper.

SQUASH.—Planted April 26.

Fordhook. Vines long; productive; squash 8 to 11 inches long, 3 to 5 inches across; flesh thick, firm, sweet, good.

Hubbard. Productive, but small this year on account of drought; quality very good.

Long White Bush Marrow. Productive; squash 10 to 14 inches long, 3 to 4 in width; not very good quality.

Essex Hybrid. Vines long and productive; squash large and fine flavoured.

Mammoth Whale. Productive but small on account of drought; good for stock.

Long White English Vegetable Marrow. Vines long and productive; squash 10 to 18 inches in length; very fine quality.

Cocoanut. Vines long and productive; squash small, round, deeply ribbed; dry and sweet; quality very fine.

Delicata. Vines long and productive; solid, dry, sweet, good; quality, very fine; a very good keeper.

Cocozelle. Vines short and productive; squash 16 to 30 inches in length, 4 to 6 in diameter; often crooked; not very good quality; rather watery.

Marblehead. Moderately productive; not very good quality.

Delicious. Productive; 4 to 8 inches in length, 6 to 8 in diameter; solid, dry, sweet; very fine quality.

Silver Custard. Vines short; very productive; good summer squash.

Turban Squash. Vines long and productive; good size for sort; good, dry, sweet.

Perfect Gem. Vines long and productive; squash as large as a cocoanut; very good quality.

Golden Bronze. Productive; as large as the Hubbard; solid, deep, orange flesh; sweet, dry and fine flavoured.

Extra Early Orange Marrow. Productive; flesh solid, bright orange; not so dry as some others.

White Croockneck. Vines long and productive; flesh thin; not fine flavoured or sweet.

Bay State. Vines long and productive; squash small; flesh thin, orange in colour; sweet, fine flavoured.

English Vegetable Marrow. Productive; solid; sweet, good quality.

Brazilian Sugar. Vines long and productive; squash small, oblong; not solid or fine flavoured.

SAMPLES DISTRIBUTED.

Scions and cuttings	packages	186
3-lb. samples of seed potatoes		203
3-lb. oats		173
3-lb. pease		161
3-lb. spring wheat		56
3-lb. barley		74
Nut and tree seeds		374
		1,227

CORRESPONDENCE.

Letters received, 3,187; letters despatched, 2,953.

COMMERCIAL ORCHARDS.

A beginning was made this year towards ascertaining the profits of apple growing in this climate by planting a small commercial apple orchard. The following varieties were selected as among those which have been most successfully grown, and other sorts will be added from time to time:—King, Wagener, Monmouth Pippin, Sutton Beauty, Salome, Jonathan, Mother, Ontario, and Grimes' Golden. They were planted 30 feet apart each way, twelve trees of each sort being planted, thus making very nearly a quarter of an acre devoted to each variety. Land is being prepared for similar test orchards of plums, pears and cherries, and it is expected that a beginning in all of these will be made next spring.

APPLES.

The spring was unusually cold and wet and several light frosts occurred during the blossoming period. These unfavourable conditions prevented a full crop and many varieties failed to set fruit. The season later on was bright and warm and the quality of the fruit which did grow was very fine. The following short description of varieties includes a good many which fruited in 1904, but could not be described in the report for that year because they were not yet in season when the report was written:—

Cardinal.—Fruit above medium size, conical. Stem long and slender, cavity deep and wide, with considerable russet. Calyx large, open. Basin deep and wide. Skin clear, bright yellow, handsomely striped and splashed with bright red. Flesh white, juicy, tender, pleasant, mild sub-acid, or nearly sweet. Season early August.

Miller's Belleflower.—Fruit above medium size, somewhat oblate, tapering a little to the eye. Stem short. Cavity narrow and deep. Calyx small closed. Basin narrow, shallow and corrugated. Skin dull yellow nearly covered with dull red and sprinkled with gray dots. Flesh yellowish, firm, not juicy, sweet with a pleasant flavour. Season August.

Thistlewait.—Tree a strong grower and an early bearer. Fruit of medium size, oblong, conical. Stem medium in length, slender, cavity wide and deep. Calyx small, open. Basin wide and shallow. Skin golden yellow, streaked and splashed with red in two shades. Flesh whitish, tender, juicy, mildly sub-acid, with a pleasant agreeable flavour. Promising. Season August and early September.

Banks' Red Gravenstein.—Very similar to the common Gravenstein but with more colour. It closely resembles in every respect the Red Gravenstein of Germany. Season last of August and September.

Malcolm Dunn.—Fruit of medium size, oblate, conical, somewhat irregularly ribbed. Stem short, cavity narrow and deep. Calyx small and open. Basin deep and narrow, corrugated. Skin greenish yellow, with a dull red blush on the sunny side. Flesh rather coarse, whitish, juicy, mild and pleasantly acid. Season September.

Vrai Drap d'Or.—Fruit of medium size, roundish, somewhat flattened. Stem short, cavity narrow and deep. Calyx small, closed. Basin wide and deep. Skin dull golden yellow, with a few brown specks. Flesh yellowish, juicy, crisp, pleasant, mildly acid. Season September and October.

Noble Sovarie.—Fruit of medium size or below, roundish, somewhat ribbed. Stem of medium length, cavity wide and medium, deep. Calyx large, open. Basin wide and deep, corrugated. Skin greenish yellow, with a small reddish blush on the sunny side. Flesh whitish, juicy, mildly sub-acid, a fine cooking apple. Season September.

Rivers Early Peach.—Fruit of medium size, oblate. Stem long and slender, cavity deep and wide. Calyx small, open. Basin shallow and narrow. Skin greenish yellow, with a dull red cheek. Flesh white, soft, tender, juicy, with a very pleasant flavour, mildly acid. Season September.

Cobham.—Fruit of medium size, conical. Stem short, cavity round, deep and narrow. Calyx small, partly open. Basin shallow and wide. Skin greenish yellow, with stripes and patches of red in two shades, and sprinkled with a few yellow dots. Flesh yellowish, firm, moderately juicy, sweet, with a fine flavour. Season October and November.

Couchine.—Fruit below medium size, globular. Stem long, cavity moderately deep and wide. Calyx small, closed. Basin small and flat. Skin yellowish green, splashed with dull red on the sunny side, and sprinkled with gray dots. Flesh white, juicy, mild, pleasantly sub-acid. Season October and November.

De Prince.—Fruit medium to large, roundish oblong. Stem short and slender, cavity narrow and deep. Calyx small and closed. Basin wide and deep. Skin greenish yellow, with a red cheek. Flesh yellowish, juicy, tender, crisp, mild, pleasantly acid, with a fine flavour. Season October and November.

Home of Kent.—Fruit medium to large, roundish, conical. Stem long, cavity moderately deep. Calyx small, closed. Basin wide and flat. Skin yellow, striped with red on the sunny side. Flesh whitish yellow, crisp, juicy and pleasantly sub-acid, a fine cooking apple. Season October and November.

Farmer's Seedling.—Fruit medium to large, oblong, conical, ribbed. Stem short, cavity small and deep. Calyx large, open. Basin wide and moderately deep. Skin greenish yellow, with dots and splashes of dull red. Flesh white, firm, crisp, moderately juicy, mildly sub-acid, of good flavour, a good cooking apple. Season October and November.

King of Pippins.—Fruit small to medium, conical. Stem of medium length, cavity deep and wide. Calyx large, open. Basin wide and of medium depth. Skin russet yellow with a reddish cheek. Flesh firm, moderately juicy, sprightly and acid. Season October and November.

Cherry Pearmain.—Fruit medium to small, roundish, conical. Stem short, cavity narrow and shallow. Calyx small, closed. Basin narrow and shallow. Skin pale greenish yellow, with a reddish cheek. Flesh yellowish white, tender, juicy, mildly sub-acid. Season October and November.

Lord Grosvenor.—Fruit above medium size, oblate. Stem short, cavity narrow and shallow. Calyx large, open. Basin wide and shallow, corrugated. Skin yellow, mottled and splashed with spots of red. Flesh white, juicy, tender, sprightly acid, with a fine pleasant flavour. Season October and November.

Histon Favourite.—Fruit below medium size, roundish, conical. Stem short, cavity deep and narrow. Calyx large, closed. Basin wide and shallow. Skin a bright, clear yellow, splashed and streaked on the sunny side with bright red. Flesh firm, juicy, white, mild and pleasantly acid. Season October and November.

Surprise.—Fruit of medium size, roundish, flat. Stem short, cavity narrow and deep. Calyx small, closed. Basin narrow and deep. Skin yellow, with a bright red blush in the sun. Flesh whitish, moderately juicy, and mildly acid, sometimes stained with red. Not of much value. Season October and November.

Reinette d'Autumn d'Wilkenburg.—Fruit of medium size, globular. Stem short, cavity narrow and deep. Calyx small, closed. Basin wide and shallow. Skin greenish yellow, somewhat russeted and sprinkled with gray dots. Flesh yellowish, moderately juicy, firm, pleasantly sub-acid, with a rich flavour. Season October and November.

Reinette Etoilée.—Fruit of medium size, conical. Stem short, cavity of medium depth, narrow. Calyx large, open. Basin shallow and wide. Skin yellow, nearly overspread with red and sprinkled with gray dots. Flesh white, crisp, juicy, mild and pleasantly sub-acid. Season October and November.

Mdlle. Jeannie Hardy.—Fruit large, conical, handsome, very similar in tree and fruit to Alexander.

North Star.—Fruit above medium in size, roundish, conical. Stem short, cavity narrow and deep. Calyx small, closed. Basin deep and wide. Skin yellow with a dull red cheek. Flesh yellowish, crisp, fairly juicy, pleasantly sub-acid, a good cooking apple. Season October and November.

Oberdiek's Pearmain.—Fruit large, oblong, tapering from the middle to both stalk and eye. Stem short, stout, cavity narrow and shallow. Calyx large open. Basin narrow and shallow. Skin greenish yellow with a few gray specks about the stem. Flesh coarse, breaking, mildly sub-acid and of a pleasant flavour. Season October and November.

Plate de Parson.—Fruit of medium size, roundish. Stem long, slender, cavity narrow and deep. Calyx small, closed. Basin narrow and shallow. Skin greenish yellow, sprinkled sparsely with gray dots. Flesh white, juicy, firm, nearly sweet with a pleasant flavour. Season November.

Nathusius Taubenapfel.—Fruit of medium size, oblong, conical. Stem short, cavity narrow and shallow. Calyx small, closed. Basin narrow and deep. Skin greenish yellow with small patches of red on the sunny side. Flesh white, juicy, crisp, mild and pleasantly sub-acid. Season November.

Moyenvre.—Fruit above medium size, oblate, conical. Stem short, cavity deep and wide. Calyx large, partly open. Basin deep, wide and ribbed. Skin yellow, nearly covered with dull red. Flesh whitish, crisp, juicy, pleasantly acid, with a fine flavour. Season November.

Ostfriesischer Calvill.—Fruit of medium size, conical and prominently ribbed. Stem short, cavity deep, narrow and ribbed. Calyx small, closed. Basin narrow, deep and corrugated. Skin greenish yellow with a small blush on the sunny side. Flesh coarse-grained, not very juicy, mild and pleasantly sub-acid. Season November.

Royal Pearmain.—Fruit of medium size, roundish, tapering to the eye. Stem short, cavity narrow and deep. Calyx large, closed. Basin wide and ribbed. Skin russet yellow with a red blush and sprinkled with gray dots. Flesh yellowish, crisp, juicy, mildly acid with an aromatic flavour. Season November and December.

Rambour Papelen.—Fruit of medium size, oblate, tapering to the eye. Stem of medium length, cavity small. Calyx large, closed. Basin deep and wide. Skin yellow, splashed with red nearly over the whole surface. Flesh yellowish white, a little coarse, breaking, sprightly, pleasantly acid. Season November and December.

Royal d'Angleterre.—Fruit above medium in size, roundish, tapering a little to the eye. Stem short, cavity deep and narrow. Calyx small, closed. Basin deep, wide and corrugated. Skin russet yellow with a pinkish blush and sprinkled with golden dots.

Flesh yellowish, crisp, rich, juicy, mildly sub-acid, with a rich and pleasant aromatic flavour. Season November and December.

Kinnaird's Choice.—Fruit of medium size, roundish. Stem short, cavity narrow and shallow. Calyx small, closed. Basin shallow and small. Skin yellow, nearly covered with bright red. Flesh yellowish, crisp, juicy, mild and pleasantly sub-acid, slightly aromatic. Skin very tender and inclined to scab. Season November and December.

Winter Quarrenden.—Fruit of medium size, round, flat. Stem short, cavity wide and deep and russeted about the stem. Calyx small, closed. Basin wide, shallow, corrugated. Skin yellow, nearly covered with dark, dull red. Flesh white, juicy, crisp, mild and agreeably acid with a pleasant flavour. Season November to February.

Borsos Alma.—Fruit below medium in size, globular, slightly conical. Stem short, cavity narrow and deep. Calyx small, closed. Basin narrow and shallow. Skin greenish yellow, with a few small patches of red. Flesh white, juicy, mild and pleasantly acid. Season November and December.

Baron Ward.—Fruit of medium size, roundish, oblate. Stem short, cavity narrow and deep. Calyx small, open. Basin small and shallow. Skin yellow, mottled with pale red on the sunny side. Flesh yellowish, not juicy, mildly acid. Season November and December.

White Spanish.—Fruit of medium size, slightly conical. Stem short, cavity narrow and deep. Calyx small, closed. Skin pale yellow, sprinkled with light dots. Flesh yellowish white, juicy, mildly acid, with a fine pleasant flavour. Season November to January.

Reinette Coulon.—Fruit medium to large, roundish, oblate, tapering slightly to the eye. Stem short, cavity deep. Calyx small, closed. Basin deep and wide. Skin yellow with a red cheek and sprinkled with gray dots. Flesh whitish, crisp and sprightly acid, with a pleasant flavour. Season November and December.

Cowarne Queening.—Fruit of medium size, conical. Stem short, cavity narrow and deep. Calyx small and open. Basin small. Skin yellow, nearly covered with dull red, and sprinkled with yellow dots. Flesh white, tender, juicy, mild and pleasantly acid. Season November and December.

Amelia.—Fruit of medium size, roundish, conical. Stem short, cavity wide and deep. Calyx of medium size, closed. Basin shallow, narrow and corrugated. Skin yellow, splashed with bright red. Flesh white, firm, fine grained, juicy, mildly and pleasantly acid. Season November and December.

Reinette Dure.—Fruit below medium size, oblate. Stem short, cavity deep. Calyx large, open. Basin wide and shallow. Skin russet, with a dull red cheek. Flesh white, fine grained, juicy, of a mild pleasantly sub-acid character. Season November and December.

Alfriston.—Fruit large, roundish, slightly ribbed, and tapering a little from base to eye. Stem short, cavity small. Calyx large, open. Basin wide, shallow and corrugated. Skin greenish yellow. Flesh yellowish white, crisp, juicy, sprightly, a good cooking apple. Season November and December.

Claygate Pearmain.—Fruit of medium size, roundish, conical. Stem slender, cavity wide and shallow. Calyx small, partly open. Basin deep and wide. Skin russet yellow, with a reddish cheek. Flesh yellowish, tender, moderately juicy, mild and pleasantly acid, with a good aromatic flavour. Season November to January.

De Geai.—Fruit medium to small, roundish, oblate. Stem short, cavity narrow and shallow. Calyx large, closed. Basin large. Skin greenish, with a few streaks of dull red and a whitish bloom. Flesh firm, white, juicy, mildly sub-acid, with a pleasant flavour, but too small. Season November and December.

Bouton d'Or.—Fruit small, round. Stem short, cavity small. Calyx large, open. Basin deep and wide. Skin golden yellow, with a small red cheek and a few white dots. Flesh white, crisp, juicy, sweet, with a pleasant flavour. Season November and December.

Ferdinand Gaillard.—Fruit below medium size, conical. Stem short, cavity deep. Calyx large, open. Basin deep and wide. Skin russet, golden yellow, with small dots and patches of red on the sunny side. Flesh white, firm, crisp, juicy, sprightly and pleasantly acid. Season November and December.

Forest No. 1.—Fruit medium to large, globular, flattened. Stem short, cavity wide and deep. Calyx large, closed. Basin wide deep and ribbed. Skin greenish yellow, with a small red cheek and a few white dots. Flesh white, firm, juicy, mildly sub-acid. Season November to January.

Josephine Kreuter.—Fruit of medium size, oblong, conical. Stem short, cavity shallow and wide. Calyx small, closed. Basin narrow and deep. Skin greenish yellow, splashed and streaked with red and sprinkled with golden dots. Flesh yellowish, crisp, fine grained, juicy, sub-acid, with a fine pleasant flavour. Season November and December.

Isherwood.—Fruit below medium size, oblong, conical. Stem short, cavity small. Calyx small, closed. Basin deep and wide. Skin clear golden yellow, with a bright red cheek. Flesh yellowish white, crisp, firm, juicy, mildly sub-acid, core large and open. Season November and December.

Reinette dorée de Versailles.—Fruit of medium size, roundish. Stem short, cavity small. Calyx small, closed. Basin narrow and deep. Skin russet golden, with many gray dots. Flesh white, fine grained, tender, juicy, sub-acid, with a rich aromatic flavour. Season November and December.

Reinette Wadhurst.—Fruit above medium size, roundish, conical. Stem short, cavity small. Calyx small, closed. Basin small. Skin yellow, splashed with red on the sunny side. Flesh yellowish, crisp, moderately juicy and acid. Season November and December.

Forest.—Fruit small, roundish, flattened. Stem long, cavity deep and narrow. Calyx small, closed. Basin shallow. Skin yellow with a few gray dots and a dull red cheek. Flesh yellowish, crisp, moderately juicy and pleasantly sub-acid. Season November and December.

Royal Late.—Fruit medium to large, oblong, conical, slightly ribbed. Stem short, cavity narrow and deep. Calyx large, closed. Basin deep and wide. Skin dull yellowish green, with many whitish dots. Flesh whitish, firm, a little coarse, juicy, pleasantly sub-acid. Season November and December.

Reinette Musque.—Fruit below medium size, flat, globular. Stem of medium length, cavity narrow and deep. Calyx small, closed. Basin small. Skin yellowish green, with a red cheek and russet about the stem and calyx. Flesh white, juicy, fine grained, with a rich aromatic flavour, but withers and becomes leathery before the end of December. Season November and early in December.

Reinette de Fournière.—Fruit small, conical. Stem long, cavity deep and narrow. Calyx large, open. Basin flat and shallow. Skin russet, sprinkled with brown dots. Flesh yellowish, firm, juicy, mild and pleasantly acid. Season November and December.

McIndoe's Russet.—Fruit of medium size, oblate, angular, tapering to the eye. Stem short, cavity narrow and shallow. Calyx large, open. Basin wide and shallow. Skin dull russet green, with many brown dots. Flesh whitish, coarse, not juicy, mildly acid, a cooking apple. Season November and December.

Old Winter Nonpareil.—Fruit small, roundish. Stem short, cavity narrow and deep. Calyx small, closed. Basin small. Skin russet bronze with a dull red cheek. Flesh crisp, juicy, mildly sub-acid with a rich aromatic flavour. Season November and December.

Winter Pearmain.—Fruit of medium size, roundish, conical. Stem short, cavity deep and narrow. Calyx of medium size and closed. Basin wide and deep. Skin greenish yellow with a deep reddish blush in the sun. Flesh yellowish, firm, crisp, moderately juicy with a fine aromatic flavour. Season November and December.

President Gaudy.—Fruit of medium size, oblate and deeply ribbed. Stem short, cavity small. Calyx small, closed. Basin wide and deep and deeply corrugated. Skin russet yellow with a dull red cheek. Flesh yellowish, juicy, of a pleasant mild sub-acid character with a fine flavour. Season November and December.

Norfolk Bearer.—Fruit of medium size, oblate, conical. Stem short, cavity small. Calyx small, closed. Basin deep and ribbed. Skin pale yellow, splashed and mottled with red in the sun. Flesh whitish yellow, tender, juicy, pleasantly sub-acid, a good cooking apple. Season November and January.

Pine Golden Pippin.—Fruit of medium size, oblate. Stem long, slender, cavity narrow and deep. Calyx large, open. Basin wide and shallow. Skin dull yellow with russet about the stem and a red cheek. Flesh yellowish, not juicy, mildly acid, of poor quality. Season December.

Posson de France.—Fruit of medium size, oblong, conical. Stem short, cavity narrow and deep. Calyx small, closed. Basin narrow and deep. Skin greenish yellow with a little red. Flesh white, crisp, moderately juicy, without much flavour. Season December.

Pryor's Red.—Fruit below medium size globular. Stem short, cavity narrow and deep. Calyx small, closed. Basin small. Skin greenish-yellow nearly overspread with streaks and patches of dull red, and sprinkled with white dots. Flesh yellowish, tender, juicy, pleasantly acid, with a rich, fine flavour. Season December and January.

Peffer.—Fruit below medium size, globular. Stem long. Cavity narrow and deep. Calyx small, open. Basin wide and shallow. Skin yellow with a bright red cheek. Flesh white, tender, juicy and mildly acid. Season December and January.

Reinette Clochard.—Fruit of meidium size, oblate. Stem short. Cavity narrow and deep. Calyx small, closed. Basin small. Skin greenish yellow with a dull red cheek and many whitish dots. Flesh white, crisp, not very juicy and mildly sub-acid. Season December and January.

Prince Anatol Gazarine.—Fruit of medium size, conical. Stem long. Cavity deep and wide. Calyx large, open. Basin small. Skin yellow russet with a red cheek

and many greenish russet dots, and russet about the steam. Flesh yellowish, firm, juicy, mildly acid with a fine pleasant flavour. Season December to January.

Reinette Luisante.—Fruit below medium size, globular. Stem slender and long. Cavity narrow and deep. Calyx small, closed. Basin small. Skin clear yellow with a blush on sunny side. Flesh firm, moderately juicy, moderately sub-acid, with a rich and pleasant flavour. Season December and January.

Reinette à Chair Vert.—Fruit below medium, globular. Stem medium. Cavity small. Calyx small, closed. Basin wide and flat. Skin clear, golden yellow, with a few whitish dots. Flesh white, juicy, crisp, with a rich spicy flavour, mildly sub-acid, withers and becomes leathery in January. Season December and January.

Reinette de Fromm.—Fruit medium, large, conical. Stem short. Cavity narrow and deep. Calyx large, open. Basin deep and wide. Skin golden yellow with a few russet dots and a little russet about the stem. Flesh yellowish, medium juicy, mild, pleasant, sub-acid. Season December and January.

Reinette de Mauss.—Fruit medium size, conical. Stem short. Cavity large. Calyx small, closed. Basin wide and deep. Skin greenish yellow with a red cheek and sprinkled with gray dots. Flesh whitish juicy, mild, pleasant, acid, fine flavour. Season December and January.

Reinette dorée de Deitz.—Fruit small, globular. Stem long. Cavity narrow and deep. Calyx small, closed. Basin wide and shallow. Skin clear yellow with a red blush and many gray dots. Flesh yellowish, fine grained, crisp, juicy, aromatic, sub-acid, pleasant. Season December and January.

Rayée d'Hiver.—Fruit of medium size, oblate. Stem short. Cavity deep and wide. Calyx small, closed. Basin small, corrugated. Skin greenish yellow, striped with bright red and sprinkled with gray dots. Flesh yellowish, juicy, mildly sub-acid, with a fine flavour. Season December and January.

Reinette de Saintonge.—Fruit small, conical. Stem short. Cavity small. Calyx small. Basin small, closed. Skin russet with many golden russet dots. Flesh white, juicy, mildly acid with a pleasant flavour. Season December and January.

Nausemond Beauty.—Fruit below medium size, conical. Stem of medium length. Cavity large. Calyx medium. Basin wide and deep. Skin clear yellow, nearly covered with streaks and patches of bright red. Flesh white, fine grained, juicy, tender, mildly acid. Season December to March.

Sharp's Reinette.—Fruit small, conical. Stem short. Cavity narrow and deep. Calyx small. Basin closed, wide and shallow. Skin yellow, nearly covered with deep red and a few golden dots. Flesh yellowish, moderately juicy, firm with a rich aromatic flavour, mildly sub-acid. Season December to March.

Sweet Pipka.—Fruit small, oblate. Stem long. Cavity narrow and deep. Calyx large, closed. Basin wide. Skin greenish yellow with a slight blush. Flesh white, not juicy, sweet. Season winter.

Vicar of Beighton.—Fruit large, oblong, globular, ribbed. Stem short, stout, cavity deep and wide. Calyx large, closed. Basin small. Skin greenish yellow with a red cheek. Flesh yellowish white, moderately juicy, sprightly with a pleasant acidity, a good cooking apple. Season December and January.

Fraise d'Hoffinger.—Fruit above medium size, globular. Stem short, cavity narrow and shallow. Calyx small, open. Basin wide and deep. Skin yellow with dots

and narrow streaks of bright red. Flesh white, firm, juicy, mildly sub-acid with a pleasant flavour. Season December to March.

Doucine.—Fruit large, oblate, irregularly ribbed. Stem short, cavity small. Calyx small, closed. Basin shallow and ribbed. Skin greenish yellow with a small blush. Flesh white, juicy, mildly acid, a good cooking apple. Season December and winter.

Le Lunow.—Fruit large, conical. Stem short, cavity narrow and deep. Calyx medium, closed. Basin small. Skin greenish yellow with a bright red cheek. Flesh white, juicy, crisp, mildly acid with a pleasant flavour. Season December to February.

De Hoffinger.—Fruit above medium size, oblate, flattened. Stem medium, cavity deep and narrow. Calyx small, closed. Basin narrow, shallow and corrugated, skin yellow with a red cheek. Flesh yellowish white, a little coarse, not juicy, mildly acid. Season December to February.

Borsdorf Krassol.—Fruit of medium size, oblate. Stem long, cavity deep and wide. Calyx large, closed. Basin wide and deep. Skin greenish yellow with many white dots. Flesh white, firm, crisp, juicy, pleasantly acid, perfumed and of good flavour. Season winter.

Admirable de Kew.—Fruit small, globular. Stem short, cavity deep, narrow. Calyx large, open. Basin wide and shallow. Skin pale yellow with a few whitish dots. Flesh white, not juicy, of a sprightly acid character. Season winter.

Rambour de Brunswick.—Fruit above medium size, roundish, slightly conical. Stem short, cavity narrow and deep. Calyx small, closed. Basin wide and deep, corrugated. Skin greenish yellow with splashes and stripes of bright red. Flesh yellowish, tender, juicy, mildly sub-acid. Season December and January.

American Rambour.—Fruit large, roundish, globular. Stem short, cavity small. Calyx small, closed. Basin small. Skin yellow with a blush in the sun, and sprinkled with whitish dots. Flesh crisp, white, juicy, nearly sweet, with a fine, pleasant flavour. Season December and January.

Reinette d'Etlin.—Fruit below medium size, oblate, conical. Stem long slender, cavity narrow, deep. Calyx large, open. Basin wide and shallow. Skin russet. Flesh white, juicy, mild and pleasant, with a fine flavour. Season December and January.

Reinette d'Adenaw.—Fruit of medium size, flat, round. Stem short, cavity small. Calyx large, closed. Basin small and corrugated. Skin handsome russet. Flesh white, not juicy or high flavoured. Withers early in January. Not desirable.

Armorelle.—Fruit small, oblate. Stem short, cavity narrow and deep. Calyx large, open. Basin flat, narrow. Skin russet green and sprinkled with russet dots. Flesh yellowish, firm, juicy, with a rich, high flavour, mildly acid. Season January to March.

Bedford.—Fruit small, conical. Stem short, cavity narrow and deep. Calyx small, closed. Basin shallow. Skin russet yellow with a dull red cheek. Flesh yellowish, firm, crisp, juicy, mild and pleasantly acid. Season January to March.

Beauty of Moray.—Fruit of medium size, conical. Stem short, cavity small. Calyx medium. Basin deep and ribbed. Skin yellowish green with a slight blush on sunny side, and sprinkled with brown dots. Flesh white, juicy, crisp, mildly sub-acid. Season winter.

Figue.—Fruit small, oblong, tapering towards the stem, which is set flush, with a fleshy protuberance at side. Calyx small, closed. Basin small. Skin yellow, sometimes with a faint blush. Flesh white, moderately juicy and pleasantly acid. This has very little merit. Season January to March.

Frederick de Bade.—Fruit medium to large, irregular, sometimes deeply ribbed, globular. Stem short, cavity small. Calyx large, closed. Basin deep, wide and deeply ribbed. Skin pale yellow with stripes of red on sunny side. Flesh whitish, firm, juicy, nearly sweet, with a very pleasant flavour. Season January to March.

Grosse Franche.—Fruit below medium size, roundish, conical. Stem long, cavity narrow and deep. Calyx small, closed. Basin small. Skin russet yellow with a dull red cheek. Flesh yellowish, firm, of a mild pleasantly sub-acid character. Season January and February.

L'Abondant.—Fruit of medium size, conical. Stem short, cavity small. Calyx small, closed. Basin shallow. Skin greenish yellow with many gray dots. Flesh greenish white, juicy, with a fine flavour, nearly sweet. Season January and February.

Keddleston Pippin.—Fruit small, roundish, conical. Stem long, slender, cavity large. Calyx large, open. Basin narrow and deep. Skin yellowish green. Flesh yellowish, moderately juicy, fine grained, mild and pleasantly sub-acid. Season January to March.

William Anderson.—Fruit small, conical. Stem short, cavity small and deep. Calyx large, open. Basin small. Skin greenish yellow with a considerable quantity of red on the sunny side. Flesh white, firm, juicy, mildly sub-acid with a pleasant flavour. Season January and February.

Franckjaer.—Fruit large, conical Stem long, cavity narrow and deep. Calyx small, closed. Basin narrow and deep. Skin yellowish with yellowish white dots and an orange blush on the sunny side. Flesh greenish white, crisp, moderately juicy, mild and pleasantly acid. Season January to March.

Rawle's Janette.—Fruit of medium size, oblate, conical. Stem short, cavity wide and shallow. Calyx small. Basin broad and flat. Skin pale yellow splashed and striped with bright red. Flesh whitish, tender, juicy, mildly sub-acid with a pleasant flavour. Season January to March.

Rose de Bohemie.—Fruit of medium size, oblate, conical. Stem short, cavity small. Calyx small, closed. Basin shallow. Skin clear golden with a bright red cheek. Flesh yellowish white, moderately juicy, crisp, mildly acid with a very pleasant flavour. Season January to March.

Reinette Grise Parmentier.—Fruit below medium size, globular. Stem long, with a fleshy knob alongside. Calyx small, closed. Basin small. Skin bronze russet with many brown dots. Flesh greenish white, moderately juicy, pleasantly sub-acid. Season January and February.

Striped Canada Reinette.—Fruit large, oblate, conical, ribbed. Stem short, cavity wide and deep. Calyx large, partly open. Basin wide and corrugated. Skin greenish yellow with a bright red cheek. Flesh yellowish, breaking, moderately juicy, mildly sub-acid. Season January to March.

French Reinette.—Fruit of medium size, globular, oblong. Stem short, cavity small. Calyx small, closed. Basin small. Skin golden russet with a red cheek and

many white dots. Flesh white, not juicy or high flavoured, becomes leathery early in winter, but does not decay. Of no special value. Season January to March.

Reinette de Geer.—Fruit below medium size, oblate, compressed. Stem long, cavity small. Calyx small, closed. Basin narrow. Skin yellow with patches of russet. Flesh yellowish, moderately juicy, with a pleasant flavour. Season January to March.

Nez Plat.—Fruit small, oblate. Stem short, cavity small. Calyx small, closed. Basin narrow and deep. Skin greenish yellow with a dull red cheek, and many small white dots. Flesh yellowish, juicy, mildly sub-acid, with a pleasant flavour. Season January to March.

Romanite.—Fruit medium to large, conical. Stem short, cavity deep. Calyx large, closed. Basin deep, narrow. Skin yellow with a red cheek. Flesh yellowish, fine, juicy, pleasantly acid, with a fine flavour. Season January to March.

Du Vendue Levique.—Fruit below medium size, oblong, tapering a little to the eye. Stem medium, cavity deep and wide. Calyx small, closed. Basin narrow and deep. Skin greenish yellow with a small reddish blush and sprinkled with gray dots. Flesh whitish, juicy, firm, crisp, mildly acid, with a pleasant flavour. Season January to March.

De Lestre.—Fruit small, oblong, tapering to the eye. Stem short, cavity narrow. Calyx large, closed. Basin wide and corrugated. Skin greenish yellow, with a dull red cheek, and a few golden dots. Flesh white, juicy, crisp, pleasantly acid. Season January to April.

Bonne de Mai.—Fruit small, oblate. Stem short, cavity round and deep. Calyx large, closed. Basin wide. Skin greenish yellow with a handsome blush, and a few small white dots. Flesh white, moderately, juicy, very little flavour. Season May and June.

Barbarie.—Fruit of medium size, oblate. Stem short, cavity small. Calyx small, closed. Basin small. Skin pale yellow with a bright red cheek and a few whitish dots. Flesh yellowish, juicy and pleasantly acid. Season March to May.

Green Skin.—Fruit very small, oblate. Stem long, cavity small and deep. Calyx large, closed. Basin wide and shallow. Skin green with a faint blush in the sun. Flesh white, not juicy nor desirable. Season May to June.

Grosse Locarde.—Fruit of medium size, oblate, somewhat irregular in form and ribbed. Stem long, cavity narrow and deep. Calyx small, closed. Basin small. Skin clear, glossy yellow with a blush on sunny side. Flesh whitish, juicy, a mild sub-acid with a pleasant flavour. Season February to May.

In addition to the list of varieties discarded, which was given in last year's report, the following sorts have been removed:—

Alexander.
Benoni.
Black Annette.
Black Apple of New Jersey.
Black Oxford.
Blue Pearmain.
Blushed Calville.
Bogdanoff.
Borovinka Koslov.
Longfield.
Malus Edulis.
Mann.
McEwen's Sweet.
Minkler.
Miron Grell.
Missouri Pippin.
Nancy Jackson.
Newton Pippin.

Borovinka Solovieff.
Borsdorf.
Borsdorf No. 19.
British Columbia.
Canada Red.
Cantil Sinap.
Cellini.
Charlottenthaler.
Charlemoff.
Cinnamon.
Cinnamon Pine.
Cooper's Market.
Cox's Orange Pippin.
Cox's Pomona.
Day.
Delaware Winter.
Devonshire Quarrenden.
Duchess of Oldenburg.
Early Harvest.
Early Strawberry.
Fall Pippin.
Flat Voronesch.
Flora Belle.
Florence.
Gano.
Gideon's No. 9.
Gideon's No. 10.
Gill's Beauty.
Gloria Mundi.
Golden Nonpareil
Green Crimean.
Green Stripe.
Gremuch.
Grindstone.
Haskell's Sweet.
Headly.
Hibernal.
Himbeer.
Hurlbut.
Huntsman's Favourite.
Indian.
Iowa Blush.
Jersey Sweet.
Juneating Red.
Karabovka.
Kentish Codlin.
Knevskoe.
Koursk Anis.
Kruder.
Lady.
Lansingburgh.
Lapough Koslov.
Little Hat.
Little Red Romanite.
No. 457 (Budd).
No. 469 (Budd).
No. 9 Voronesch.
Orel (980).
Ornement de Table.
Ortley.
Ostrakoff.
Palouse.
Paradise Sweet.
Parson Sweet.
Peasgood's Nonsuch.
Peck's Pleasant.
Pomme Grise.
Porter.
Price's Sweet.
Pumpkin Sweet.
Pyle's Red Winter.
Putim.
Queter.
Red Queen (No. 316 Budd).
Red Subluck.
Red Winter Pearmain.
Reinette Burckhardt.
Reinette Golden.
Renard's Seedling.
Ribston Pippin.
Repolovka.
Round Borsdorf.
Ruby Gem.
Salome.
Scarlet Cranberry.
Silken Leaf.
Simbrisk (No. 3).
Simbrisk (No. 10).
Skrosnina.
Stone Antônovka.
Summer Spice.
Swaar.
Swayzie Pomme Grise.
Sweet Spitzenburg.
Switzer.
Vargulek (55 Vor).
Voronesch (No. 9).
Western Beauty.
Whennery's Red.
White Pigeon.
White Winter Pearmain.
William's Favourite.
Willow Twig.
Wolf River.
Wyken Pippin.
Yellow Bellflower.
Yellow Transparent.
Zototoreff.

PEARS.

Many of the older pear trees have been removed, and not many of the younger trees bore fruit this year. A few of last year's crop which matured too late in the season to be described have been included in this year's report.

Lemonay.—Tree a strong grower, with healthy foliage. Fruit medium size, acute, pyriform. Stem long and fleshy at junction. Calyx large, open. Basin wide and shallow. Skin handsome golden yellow. Flesh white, juicy, sweet, crisp. Season August.

Beurre Romain.—Fruit below medium size, obtuse pear-shape. Stem short. Calyx large, open. Basin narrow and shallow. Skin dull greenish yellow, with a few russet dots. Flesh yellowish, not juicy, astringent, poor in quality. Season August and September.

German Bergamot.—Fruit small, obtuse, pyriform. Stem long. Calyx large, open. Basin shallow and wide. Skin yellowish russet, with many gray dots. Flesh yellowish, tender, juicy, sweet and of pleasant flavour. Season August and September.

Calvin.—Fruit small, roundish, pyriform. Stem very short. Calyx small, open. No basin. Skin greenish, with a russet bronze over nearly the whole surface. Flesh white, juicy, with a pleasant, aromatic vinous flavour. Season September.

Eva Baltet.—Fruit large, obtuse, pyriform. Stem very short set with a fleshy knob at one side. Calyx large, open. Basin narrow and shallow. Skin greenish yellow, with a reddish cheek and many brown dots. Flesh yellowish, fine grained, juicy, sweet, but not high flavoured. Season October.

Madam Hemmingway.—Fruit of medium size, handsome, a regular pear-shape. Stem long, inserted by a lip. Calyx small, closed. Skin clean, handsome russet. Flesh white, juicy, tender, sweet with a very pleasant flavour. Season October.

President Heron.—Fruit of medium size, obtuse, pyriform. Stem long, set in a small deep cavity. Calyx large, open. Basin wide and flat. Skin a handsome russet yellow. Flesh white, juicy, buttery sweet, melting with a fine flavour. Season October.

Vice President Delahaye.—Fruit of medium size, oblate, pyriform. Skin russet yellow, with a few gray dots. Flesh whitish, juicy, sprightly, with a very pleasant aromatic flavour. Season October and November.

Enfant Vantais.—Fruit medium to large, obovate, acute pyriform. Stem short and set at an angle. Calyx small, partly open. Skin yellow russet with a blush. Flesh yellowish, juicy, tender, sprighty with a fine aromatic flavour. Season November.

Le Lectier.—Fruit small, oblate, pyriform. Stem long and slender. Calyx large, open. Basin narrow and shallow. Skin russet yellow with many brown dots. Flesh whitish, not juicy or tender, nearly sweet with a fairly pleasant flavour, not valuable. Season November.

Henri de Bourbon.—Fruit of medium size, regularly formed. Stem long. Calyx moderately open. Skin greenish yellow with a reddish blush, and sprinkled with gray dots. Flesh yellowish, juicy, tender, fine grained, sweet with a fine aromatic flavour. A little gritty at the core. Season November.

Duchess de Berry.—Fruit medium to large, oblong, acute, pyriform. Stem long. Calyx large, open. Basin wide and shallow. Skin greenish yellow, sprinkled with

gray dots. Flesh yellowish white, juicy, sweet, buttery very pleasant, a little granular at the core. Season November.

Fondante Thirriot.—Fruit large, obtuse, pyriform. Stem long, set in a cavity, fleshy at the junction. Calyx large, open. Basin wide and deep. Skin yellowish russet freely sprinkled with gray dots. Flesh whitish, tender, juicy, mildly acid, vinous, aromatic. Season November.

Ferdinand Gaillard.—Fruit of medium size, obtuse, pyriform. Stem short and inclined. Calyx small. Basin deep and narrow. Skin greenish yellow with a few russet dots. Flesh yellowish, white, tender, melting, fine grained, juicy, sweet. Season November and December.

Louise Bonne Saunier.—Fruit small, oblong, pyriform. Stem long, slender, set in a narrow cavity. Calyx open. Skin dull yellow. Flesh yellowish, crisp, juicy, slightly vinous. Season November and December.

Madame Bonnefond.—Fruit medium to large, oblong, obtuse, pyriform. Stem long, set inclined. Calyx large, closed. Basin medium, wide and deep. Skin russet yellow, freely sprinkled with brown specks. Flesh yellowish, juicy, tender, buttery, sweet, a little gritty at the core. A promising sort. Season November.

PLUMS.

The plum crop with many varieties was fairly good this season, but the constant showers in the first half of the growing period favoured the development of fungus diseases, and at the same time prevented effective spraying, and as a consequence plum rot was very bad. Our distance from a market makes this a serious matter for us as many plums that would be excellent for use any time within thirty-six hours will not stand two or three days, and in consequence many fine plums have to be allowed to go to waste. The following new sorts fruited for the first time this year and several of them give promise of being valuable:—

Catalogne.—Tree a strong grower and productive. Fruit below medium size, oval. Skin yellow. Flesh yellowish, firm, sweet, juicy, free stone, and stone small. Season second week in July.

Jaune Tres Hative Babond.—Tree a slender grower. Fruit medium or below in size, pear shape. Stem short. Skin yellow. Flesh yellow, juicy, tender, sweet, with a pleasant flavour. Season middle of July.

Damas de Cone.—Fruit medium to large, roundish, depressed. Suture deep with one side enlarged. Stem short, set in a round basin. Suture terminates in a small basin. Skin yellow, mottled with dull red. Flesh yellowish, juicy, sweet with a pleasant flavour, adheres a little to the stone. Season last of July.

Datte Verte.—Fruit medium to small, oval. Stem short. Skin deep purple with a bluish bloom. Flesh greenish, juicy, sweet with a rich flavour. Very fine for canning. Stone small and free. Ripe last of July.

Precoce de Berthold.—Fruit small, oval, pale yellow. Stem short. Suture shallow. Flesh yellowish, sweet, not juicy nor fine flavour. Stone small and free. Ripe last of July.

Perdrigon Violet.—Fruit medium or below medium in size, roundish, oval. Stem short, cavity small. Skin reddish purple and sprinkled with golden brown dots, and

covered with a heavy bloom. Flesh yellowish, juicy, rich, sweet and of fine flavour. Stone small and free. Ripe middle of August.

America.—Fruit medium or below in size, oblong, heart shaped, terminating in a point. Stem short, slender, cavity small. Skin clear yellowish red. Flesh yellowish, moderately juicy, sweet, with a pleasant flavour. Stone large and a cling. Fruit drops badly when nearly ripe. Ripe early August to August 22.

Golden Esperen.—Fruit of medium size, roundish oval. Stem short, cavity small. Suture very slight, one side enlarged. Skin golden yellow, mottled with light streaks of green and a few crimson dots, and covered with a white bloom. Flesh yellowish, tender, juicy, sugary with a rich, high flavour. Stone small and almost free. Ripe middle of August.

Quetsche Hative.—Fruit small, pointed, heart shaped, with a faint suture. Stem short. Skin deep purple with a whitish bloom. Flesh yellow, moderately juicy, sweet, with a pleasant flavour. Stone small and free. Ripe middle of August.

Large Red Sweet.—Fruit small, oval. Stem short, inserted in a small cavity. Skin reddish yellow. Flesh reddish, not juicy nor very sweet. Adheres to the stone which is large. Ripe middle of August.

Merton's Egg.—Fruit small, oblong, oval. Stem short, set in a small cavity. Skin glossy yellow. Flesh yellowish, not juicy or sweet. Too small to be of value and lacking in quality. Ripe middle of August.

Jumelles.—Fruit medium to large, roundish. Stem short. Suture well marked, terminating in a slight depression. Skin greenish, mottled with streaks of clear yellow. Flesh juicy, sweet, luscious, rich. Stone small, adheres to one edge. Ripe middle to last of August.

Hungarian Musk Prune.—Fruit of medium size, oblong with a neck and tapering each way to each end. Stem short. Cavity very small. Suture shallow. Skin deep purple, with a whitish bloom. Flesh yellowish, moderately juicy, sweet with a rich musky aromatic flavour. Stone small and free. Ripe last of August.

Buel's Favourite.—Fruit large, roundish, largest at the stem. Stem long. Suture well defined. Skin light purple, with a whitish bloom. Flesh yellowish green, firm, moderately juicy, with a rich fine flavour. Ripe last of August.

Blue Prolific.—Fruit medium to small, roundish. Stem short. Cavity shallow. Suture indistinct. Skin very dark purple, covered with a bluish bloom. Flesh greenish yellow, tender, sprightly, with a fine pleasant flavour. Stone small and a cling. Ripe last of August.

Perdrigon Rouge.—Fruit of medium size, round. Stem long. Cavity small. Suture well marked, terminating in a depression. Skin deep red, with a whitish bloom. Flesh yellowish, a little coarse, not juicy, but of good flavour. Ripe last of August.

Oullin's Golden Gage.—Fruit of medium size, roundish oblong. Stem of medium length. Cavity wide and deep. Suture shallow. Skin golden yellow, with a few crimson dots, and a white bloom. Flesh yellow, tender, juicy, rich and sweet. Stone small and free. Ripe last of August.

Grosse Surpasse.—Fruit small, round. Stem short. Cavity shallow. Skin clear yellow, with a whitish bloom. Flesh yellow tender, sweet with a pleasant flavour. Stone small and a cling. Ripe last of August.

Swan.—Fruit medium to large, oval. Suture distinct. Stem short. Cavity small. Skin clear yellow. Flesh yellow, juicy, sweet, tender with a fine flavour. Stone small. Ripe August.

Automne de Schamali.—Fruit medium to large, oval with a neck. Stem long. Suture wide and deep, one side enlarged. Skin reddish purple, with a light blue bloom. Flesh deep yellow, juicy, sweet. Stone small and a cling. Ripe early September.

Imperiale de Milan.—Fruit medium to large, oblong, globular. Stem of medium length. Cavity deep. Suture deep, wide. Skin deep purple, with a light blue bloom. Flesh yellow, sweet, juicy with a fine flavour. Stone cling and small. Ripe early September.

Goutte d'Or.—Previously described as Coe's Golden Drop, which it is.

Reine Claude Violette.—Fruit of medium size, roundish, a little flattened. Stem long. Cavity narrow. Suture distinct. Skin purple with yellow dots, and a thick bluish bloom. Flesh greenish yellow, juicy, sweet with a rich, high flavour. Stone small and free. Ripe September.

Smith's Prolific.—Fruit of medium size, globular. Stem short, cavity deep. Suture distinct and terminating in a depression. Skin yellowish with a purple red cheek and a thin white bloom. Flesh yellowish, juicy, sprightly. Stone medium and a cling. Ripe early in September.

Bush Plum.—Fruit of medium size, roundish. Stem of medium length. Cavity deep. Suture distinct, and one side often enlarged. Skin purple with a thick bloom. Flesh yellow, sweet, fine grained, tender, moderately juicy, with a fine flavour. Ripe early in September and subject to rot.

Primate.—Fruit medium to large, round. Stem short. Cavity medium. Suture distinct, one side often enlarged. Skin reddish purple, with many golden dots, and a thin bluish bloom. Flesh yellowish, juicy, sprightly, sugary, with a fine flavour. Stone small. Ripe early in September.

Reine Claude de Woolston.—Fruit of medium size and roundish, with a distinct suture. Stem short. Cavity large for a small plum. Skin purple with a bluish bloom. Flesh yellow, moderately juicy, sweet, sugary, tender, with a very good flavour. Stone small and free. Ripe early in September.

Reine Claude de Chambourcy.—Fruit small, roundish. Stem short. Cavity large and deep. Suture deep, extending two-thirds around the fruit. Skin yellow. Flesh yellowish, moderately juicy, rich and sweet with a high flavour. Stone small. Ripe early in September.

Ungarische.—Fruit of medium size, oblong, tapering to each end. Stem of medium length. Cavity small. Suture deep. Skin dull purple with a bluish white bloom. Flesh yellowish, moderately juicy, rich, sweet, with a pleasant flavour. Ripe early in September.

Precoce de Reutlingen Prune.—Fruit below medium size, oval. Stem short. Cavity small. Suture well defined and one side enlarged. Skin deep purple with a bluish bloom. Flesh yellowish, tender, sweet, juicy, with a rich flavour. Stone small, free. Ripe early in September.

Reine Claude d'Ecully.—Fruit large, roundish. Stem short. Cavity small. Suture deep and ending in a small depression, one side enlarged. Skin greenish yellow, with

a thin white bloom. Skin thick and tough. Flesh yellowish, a little coarse, juicy, sweet, with a pleasant flavour. Ripe early in September.

Quetsche d'Allemagne.—Fruit of medium size, long, oval, very full in the middle and tapering to each end, very much enlarged on one side. Stem long. Suture shallow. Skin dark purple with a bluish bloom. Flesh yellowish, tender, moderately juicy, with a fine flavour. Ripe early in September.

Boulouf.—Fruit large, round, oblong, oval. Stem of medium length. Cavity small. Suture wide and shallow. Skin reddish purple, with a bluish bloom. Flesh yellowish, sweet, juicy, tender, rich, with a fine flavour. Ripe early in September.

Mirabelle Tardive.—Fruit small, roundish oval. Stem short. Skin pale yellow, with a few reddish dots. Flesh yellowish, firm, moderately juicy, sweet. Stone small, cling. Ripe middle of September.

Drap d'Or de l'Est.—Fruit small, round. Stem short. Cavity small. Suture very shallow. Skin yellow with a thin white bloom. Flesh yellowish, rather tough, not juicy, sweet, of no special value. Ripe in September.

CHERRIES.

The very mild weather in February and early March brought the cherry trees forward, and the blossoming was earlier than usual. This was a disadvantage because of the cold, wet weather which set in about the middle of March and continued for a long time.

The earliest sweet cherries began to ripen the last of May, and during that month and the first part of June repeated showers caused the ripening cherries to split, which made a serious loss, and the brown rot was prevalent owing to the showery weather which favoured the development of fungus diseases and prevented effective spraying.

Guigne de Louvain.—Fruit medium to large, obtuse, heart shape. Stem long. Skin bright yellow, splashed freely with bright red. Flesh juicy, very sweet, juice and flesh yellowish, tender, of very fine quality. Ripe June 4.

Ludwig's Bigarreau.—Fruit large, heart shaped, with a well marked suture. Skin bright red, juice red, sweet. Flesh pale yellow, tender, juicy, good. Ripe early in June.

Suda Hardy.—Fruit medium to large, round. Stem long. Cavity deep, round. Skin dark glossy red. Flesh tender, juicy, reddish. Juice reddish, pleasantly acid, of good quality. Ripe early in July.

Red Rock.—Fruit large for a morello, and round. Stem long, set in a depression. Skin clear, glossy red. Flesh reddish yellow, with reddish juice a mild, pleasant acid, refreshing. Season late in July.

PEACHES.

There are only a few varieties of peaches left on the farm, two named sorts on the level land and several on the bench.

The trees on the bench continue to bear a few peaches each year, which proves that in sheltered elevations they can be grown. On the level the Teton de Venus has made a vigorous growth and fruited sparingly, but the fruit is too late to ripen in this climate.

APRICOTS.

The few apricot trees living bloomed early in March, but set no fruit and might as well be dug out as they bloom too early to succeed in the cool, rainy weather which almost always occurs at the time they are in bloom.

MEDLARS.

As these trees do not bloom until well on in May, they never fail to set a crop of fruit.

MULBERRIES.

All the mulberry trees bore a good crop of fruit again this year.

SMALL FRUITS.

As the last half of the season was dry and hot, all of the small fruits ripened early, but they were not so large or so productive as in previous years.

There are under test 75 varieties of red and yellow raspberries, and after having been tested for several years under similar conditions, the following varieties have proved the best in thrift, quality and productiveness.

They are given in the order of ripening.

Red and Yellow Raspberries.

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Phoenix	June 20	Vigorous	Large	Firm, good quality	Productive.
Pauline	" 24	"	"	" continues long in bearing.	"
New Fastolf	" 25	"	"	Firm, good quality	"
Northumberland Fill Basket.	" 25	"	Very large	" continues long in bearing.	"
Duke of Brabant	" 26	"	Large	Firm, good quality	"
All Summer	" 28	"	Large medium	" continues long in bearing.	"
Lord Beaconsfield	" 29	"	"	Firm, good quality	"
London	" 29	"	"	"	"
Sarah	" 29	"	"	Firm, sweet, very good quality, the best flavored berry we have.	"
Cuthbert	" 30	"	Large	Firm, good quality	"
R. B. Whyte	" 30	"	Large medium	"	"
French Vice-President	" 30	"	Very large	" continues long in bearing.	"
Golden Queen	" 25	"	Large	Firm, good quality	"
Large Yellow	" 27	"	"	"	"

Besides the above we have the following varieties, all of which are lacking in some quality which is desirable:—

Battler's Giant, Paragon, Charles, Hornet, Carter's Prolific, Belle de Fontenay, Baumforth's Seedling, Muskingum, Turner, Franconia, Hudson River Antwerp, Thompson, White Antwerp, Columbia, Arnold's Hybrid, Red Herrenhauser, Sugar of Metz, Carleton, Empire, Sharpe, Muriel, Craig, Autumn Surprise, Knevit's Giant, La Mercier, Guinea, Garnet, Mary, Percy, Fastolf, Marlboro, Clarke, Heebner, Norwich Wonder, King, Chili, Garfield, Shaffer's Colossal, Queen Victoria, Sir John, Cariboo

Wild, Col. Wilder, Brinkle's Orange, Goliath, Lizzie, Millar, Minnie, Beehive, Spineless Yellow, Yellow Antwerp, Malta, Barnet, Lady Anne, Nonpareil, Billard's Perpetual, Prince of Wales, Champion, Crimson Beauty and Hansel.

Black Cap Raspberries.

Black Caps require very rich, well drained ground. They also require considerable moisture as well as sunshine when the berries are growing and ripening to ensure a good crop. There are under test here nineteen varieties of Black Caps.

The following have been found to be the best, given in the order of ripening:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Nemaha	July 4	Vigorous	Large	Good quality	Productive.
Palmer	" 6	"	Large medium	"	"
Older	" 6	"	"	"	"
Kansas	" 6	"	"	"	"
Mammoth Cluster	" 6	"	Large	"	"
Gregg	" 8	"	"	"	"
Progress	" 8	"	Medium	"	"
Ada	" 8	"	"	"	"
Conrath	" 10	"	"	"	"
Hopkins	" 10	"	"	"	"

Besides the above we have the following varieties:—

Carman, Smith's Prolific, Cromwell, Lovett, American Yellow Cap, Jackson's May King, Progress, Early Ohio and Oregon Late.

Blackberries.

The blackberries were a good crop this year. There were 27 varieties under test. The following are the best, and are given in the order of ripening:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Early King	July 14	Vigorous	Large	Good quality	Productive.
Snyder	" 18	"	Large medium	"	"
Hansel	" 18	"	"	"	"
Stones Hardy	" 18	"	Large	"	"
Eldorado	" 18	"	Very large	Very good quality	"
Agawam	" 18	"	Large medium	Good quality	"
Taylor	" 18	"	"	"	"
Erie	" 19	"	Large	"	"
Early Cluster	" 19	"	"	"	"
Maxwell	" 19	"	"	"	"
Ohmer	" 20	"	"	"	"
Taylor's Prolific	" 20	"	Medium	"	"
Lawton	" 22	"	"	"	"
Oregon Everbearing	Aug. 1 to Oct. 1	"	"	Fairly good, very good quality.	"

Besides the above we have the following: Wilson's Early, Tecumseh, Kittatinny, Wilson Jr., Early Harvest, Crystal White, Gainor, Thompson's Mammoth, Lovett's Best, Child's Tree Blackberry, Dallas and Brunton.

Red and White Currants.

There are 41 varieties under test. Of these the following have proved the best:—

Name.	Date of Ripening.	Growth of Plant.	Size of fruit.	Quality.	Productiveness.
La Fertile	July 3	Vigorous	Large medium	Good quality	Productive.
Raby Castle	" 3	"	"	"	"
White Grape	" 3	"	Medium	"	"
London Red	" 3	"	Large medium	"	"
La Conde	" 3	"	"	"	"
Red Cherry	" 3	"	Medium	"	"
Prince Albert	" 4	"	Large medium	"	"
Eyatt's New	" 4	"	Medium	"	"
La Turinese	" 4	"	"	"	"
White Cherry	" 4	"	"	"	"
Gondoin Red	" 5	"	"	"	"
Large White Brandenburg	" 5	"	Large medinm	"	"
Victoria	" 5	"	Medium	"	"
White Pearl	" 5	"	"	"	"

Besides the above the following varieties have been tried but found less valuable: White Transparent, White Gondoin, Red Dutch, Knights Early Red, North Star, New Red Dutch, White Dutch, Fay's Prolific, Moore's Ruby, Versailles, No. 51 (L.S.) Langstraubige, White Esperen, Rankin's Red, Large White Frauendorfer, Verriers White, Chenonceau, De la Rochepoze, Ringens, Beauty of St. Giles, Champaigner, English Red, Rouge Admirable, Large Red, White Kaiser, White Imperial.

Black Currants.

There are 44 varieties of black currants under trial here, the following have been found to be the best:—

Name.	Date of Ripening.	Growth of Plant.	Size of Fruit.	Quality.	Productiveness.
Dominion	July 5	Vigorous	Large medium	Mild, good quality	Productive.
Middlesex	" 5	"	"	" "	"
Merveille de la Gironde	" 5	"	"	Slightly acid, good quality.	"
Boskoop Giant	" 5	"	Very large	Sweet, very good quality	"
Prince of Wales	" 7	"	Large	" good quality	"
London	" 7	"	Medium	" "	"
Black Naples	" 7	"	Large	" "	"
Lee's Prolific	" 7	"	Large medium	Mild, good quality	"
Pearce	" 9	"	Medium	" "	"
Victoria	" 9	"	Large	Sweet, good quality	"
Climax	" 9	"	Medium	Mild, good quality	"

Besides the above the following have been tried, but they are not so desirable: Lennox, Bang-up, Gewohnliche, Eclipse, Sterling, Kerry, Perry, Ruler, Madoc, Kentish Hero, Ambrafarbige, Charmer, Beaudry, Ontario, Eagle, Lanark, Baldwin, Wood, Louise, Stuart, Kentville, Success, Star, Champion, Ethel, Parker, Monarch, Bella, Norton, Oxford Climax, Orton, Henry.

METEOROLOGICAL RECORD.

Date of Highest Temperature.	Temperature.	Date of Lowest Temperature.	Temperature.	Rainfall.	Snowfall.	Sunshine.	
1904.				Inches.	Inches.	Hours.	Minutes.
December 2, 25.....	46	December 16.....	12	9·02	3	13	36
1905.							
January 3, 23.....	49	January 12.....	20	5·46	3	64	54
February 12	47	Feb. 2, 15, 17, 22, 24	24	4·28	0	120	24
March 30, 31.....	56	March 11.....	13	5·60	1	92	..
April 23.....	83	April 21.....	30	4·86	.....	139	18
May 12.....	84	May 20.....	34	8·46	.....	145	48
June 12.....	86	June 13.....	37	3·20	.....	171	24
July 19.....	94	July 14, 15.....	50	2·40	.....	236	36
August 10, 20.....	83	August 28.....	40	2·80	.....	164	..
Sept. 2, 9.....	68	September 9.....	36	8·40	.....	94	30
October 13..... ...	62	October 19.....	24	8·42	.....	106	18
November 14	62	November 28.....	20	1·91	6	73	6
		Total	.....	64·81	13	1,421	54

I have the honour to be, sir,

Your obedient servant,

THOS. A. SHARPE.

STATEMENT OF EXPENDITURE ON THE DOMINION EXPERIMENTAL FARMS, FOR THE YEAR ENDING JUNE 30, 1905.

Central Experimental Farm.

Live stock			$ 625 84
Feed for stock	$ 3,532 43		
Supplies from experimental plots	90 75		
Grain screenings from grain distribution	292 79		
		$ 3,915 97	
Less—Supplies to poultry department	853 11		
			3,062 86
Veterinary services and drugs			74 56
Seed, grain, trees, &c			424 01
Implements, tools, hardware and supplies			864 89
Drainage and drain tiles			393 71
Manure and fertilizers for experimental plots and horticultural department			455 54
Travelling expenses			1,821 90
Exhibition expenses			818 74
Blacksmithing, harness supplies and repairs			400 11
Bee department			161 69
Wages: farm work, including salaries of officers in charge			4,879 06
Wages: care of stock, including salary of herdsman			3,707 02
Horticultural division, including salaries of officers in charge, also forestry $33.85			5,542 89
Poultry division, also salaries of officers in charge	$ 3,085 11		
Value of grain, &c., supplied by farm	853 11		
			3,938 22
Cereal division, including salaries of officers in charge	$ 4,156 95		
Less—Value of material supplied for feed	90 75		
" potatoes supplied for seed distribution	819 75		
	910 50		
			3,246 45
Care of hedges, avenues, ornamental trees and grounds			1,355 97
Office assistance, including English and French correspondence and messenger service			4,977 51
Printing of office supplies and stationery			623 07
Arboretum			1,400 06
Distribution of trees and tree seeds			106 94
Seed testing and care of green-houses			1,347 22
Dairy branch, including salary of dairyman			903 30
Contingencies, including $200 for advertising			324 31
Telegrams and telephones			105 50
Steers, purchased for feeding experiments			2,146 53
Books and newspapers			130 79
		$ 43,838 69	
Less—Proceeds of sale of steers, purchased for feeding experiments	$ 3,845 33		
Value of grain supplied grain distribution	232 73		
		4,078 06	
		$ 39,760 63	

EXPERIMENTAL FARM, NAPPAN, N.S.—EXPENDITURE, 1904-05.

Live stock	$	7 15
Feed for stock		1,953 88
Veterinary services and drugs		31 95
Seed grain, seeds, trees, &c		54 21
Implements, tools, hardware and supplies		355 51
Manure and fertilizers		6 40
Travelling expenses		257 22
Exhibition expenses		219 61
Blacksmithing, harness supplies and repairs		279 33
Salary of Superintendent		1,550 00
Wages, farm work, including experimental work with farm crops		2,249 68
Wages, care of stock		1,569 80
Poultry branch		90 00
Horticultural division, including experimental work with vegetables, fruits, forest and ornamental trees and flowers; also care of grounds and salary of officer in charge		1,622 73
Distribution of seed grain, potatoes, &c		91 54
Contingencies, including postage, $134; mail delivery, $90; repairs to dykes, $215		458 50
Printing and stationery		12 73
Books and newspapers		25 33
Telegrams and telephones		22 62
Steers purchased for feeding experiments		644 00
	$	11,502 19
LESS—Proceeds of sale of steers purchased for feeding experiments		1,700 98
	$	9,801 21

EXPERIMENTAL FARM, BRANDON, MAN.—EXPENDITURE 1904-05.

Live stock	$	574 13
Feed for stock		76 05
Veterinary services and drugs		60 45
Seed grain, trees, seeds, &c		62 54
Implements, tools, hardware and supplies		290 65
Travelling expenses		193 04
Exhibition expenses		275 20
Blacksmithing, harness supplies and repairs		200 10
Bee department		12 85
Salary of Superintendent		1,550 00
Wages, farm work, including experimental work, with farm crops, &c		2,839 90
Wages, care of stock		1,167 32
Horticultural branch, including experiments with vegetables, fruits and flowers; also care of Arboretum and grounds		916 44
Forestry branch, including care of hedges		565 75
Poultry branch		95 05
Office help, including delivery of mail, $141		784 65
Distribution of seed grain, potatoes, &c		196 65
Distribution of trees and tree seeds		281 25
Contingencies, including postage, $259.50		282 90
Printing and stationery		48 36
Books and newspapers		21 00
Telegrams and telephones		31 78
Drainage and drain tiles		30 50

Manure and fertilizers		$ 162 75
Steers purchased for feeding experiments		380 57
		$ 11,099 88
Less—Proceeds of sale of steers purchased for feeding experiments		607 36
		$ 10,492 52

Experimental Farm, Indian Head, Sask.—Expenditure, 1904-05.

Live stock		$ 451 75
Feed for stock		39 04
Veterinary services and drugs		37 55
Seed grain, seeds, trees, &c		71 82
Implements, tools, hardware and supplies		427 45
Travelling expenses		168 93
Exhibition expenses		9 75
Blacksmithing, harness supplies and repairs		89 80
Salary of superintendent		1,550 00
Wages, farm work, including experimental work with farm crops		3,645 38
Wages, care of stock		744 92
Horticultural branch		441 91
Poultry branch		98 67
Forestry branch, including hedges		276 52
Office help, including delivery of mail, $110		733 50
Distribution of seed grain, potatoes, &c		204 79
Distribution of trees and tree seed		173 52
Contingencies, including postage, $589.65		648 90
Printing and stationery		60 88
Telegrams and telephones		21 15
Books and newspapers		9 50
Steers purchased for feeding experiments		260 15
		$ 10,165 88
Less—Proceeds of sale of steers purchased for feeding experiments	$ 455 04	
Value of grain supplied for grain distribution at Ottawa	1,579 05	
		2,034 09
		$ 8,131 79

Experimental Farm, Agassiz, B.C.—Expenditure, 1904-05.

Live stock	$ 9 35
Feed for stock	46 50
Veterinary services and drugs	18 55
Seed grain, seeds, trees, &c	185 43
Implements, tools, hardware and supplies	570 50
Manure and fertilizers	218 36
Travelling expenses	185 00
Exhibition expenses	293 00
Blacksmithing, harness supplies and repairs	114 70
Salary of superintendent	1,550 00

Wages, farm work, including experimental work with farm crops, vegetables, fruit trees, vines, &c.	$ 3,073 71
Wages, care of stock	518 40
Poultry branch	69 85
Forestry branch, including care of hedges	256 05
Office help	120 00
Distribution of seed grain, potatoes, &c.	66 63
Clearing land	412 30
Contingencies, including postage, $185.52	210 80
Printing and stationery	9 96
Books and newspapers	20 00
Drainage and drain tiles	332 80
Telegrams and telephones	1 75
	$ 8,283 64

Summary of Expenditure, 1904-05.

Central Experimental Farm	$ 39,760 63
Nappan Experimental Farm	9,801 21
Brandon Experimental Farm	10,492 52
Indian Head Experimental Farm	8,131 79
Agassiz Experimental Farm	8,283 64

*General Expenditure.**

Distribution of seed grain, potatoes, &c., from Central Experimental Farm			$ 5,633 15
Value of grain for Indian Head	$1,569 51		
" potatoes from Experimental Division, C.E.F.	819 75		
" grain from C.E.F.	232 73		
	$2,621 99		
Less—Value of screenings charged feed for stock, C.E.F.	292 79		
		2,329 20	
			7,962 35
Entomological and Botanical Division, including salaries of officers in charge			4,265 38
Chemical Division, including salaries of officers in charge			4,952 48
Salaries general, including—			
Director, accountant, director's secretary and assistant accountant			6,350 00
			100,000 00
Printing bulletins and distribution of bulletins and reports	7,000 00		
Less—Special sum in estimates for this item	7,000 00		
			100,0000 00

* These items are put under 'General Expenditure' for the reason that they are incurred for general purposes.

Summary of Stock, Machinery, Implements, &c., on Hand December 1, 1905.

CENTRAL EXPERIMENTAL FARM, OTTAWA, ONT.

19	Horses	$ 3,930 00
21	Ayrshire cattle	2,870 00
12	Guernsey cattle	2,175 00
15	Durham cattle (Shorthorns)	4,300 00
10	Canadian cattle	1,400 00
19	Grade cattle	865 00
63	Yorkshire swine	1,250 00
21	Berkshire swine	460 00
31	Tamworth swine	455 00
31	Shropshire sheep	800 00
16	Leicester sheep	405 00
	Farm machinery and implements	3,142 25
	Vehicles, including farm wagons and sleighs	1,018 00
	Hand tools, hardware and sundries	1,143 10
	Harness	597 85
	Dairy department, machinery, &c	508 50
	Horticultural and forestry departments, implements, tools, &c	871 35
	Botanical department, implements, tools, &c	5 00
	Poultry department, 396 fowls	622 00
	Poultry department, implements, furnishings, &c	19[illegible] 35
	Bees and apiarian supplies	449 81
	Chemical department, apparatus and chemicals	2,200 96
	Books and several departments	707 86
	Greenhouse plants, supplies, &c	2,320 09
	Furniture at Director's house	1,000 00
	Office furniture and stationery	1,676 25
	Experimental flour mill and electric motor	465 00
		$35,834 28

Experimental Farm, Nappan, N.S.

8	Horses	$ 1,085 00
5	Guernsey cattle	425 00
7	Holstein cattle	300 00
8	Ayrshire cattle	475 00
45	Grade cattle	912 00
4	Yorkshire swine	95 00
2	Berkshire swine	45 00
43	Grade swine	265 00
22	Sheep	270 00
61	Fowls	61 00
	Bees and apiarian supplies	27 30
	Vehicles, including farm wagons and sleighs	355 75
	Farm machinery	701 00
	Farm implements	292 00
	Hand tools, hardware and sundries	380 50
	Harness	250 00
	Furniture for reception room and bedroom for visiting officials	159 50
	Furniture supplies and books for office	228 11
		$ 6,327 16

EXPERIMENTAL FARM, BRANDON, MAN.

13	Horses	$ 1,525 00
5	Ayrshire cattle	290 00
7	Durham cattle	600 00
3	Guernsey cattle	175 00
8	Grade cattle	280 00
1	Tamworth pig	15 00
3	Berkshire pigs	30 00
9	Yorkshire swine	70 00
10	Grade swine	40 00
120	Fowls	129 00
	Bees and apiarian supplies	142 45
	Vehicles, including farm wagons and sleighs	540 00
	Farm machinery	2,125 33
	Farm implements	738 00
	Hand tools, hardware and sundries	641 55
	Harness	219 25
	Furniture for reception room and bedroom for visiting officials	161 55
	Furniture supplies and books for office	436 70
		$ 8,158 83

EXPERIMENTAL FARM, INDIAN HEAD, N.W.T.

13	Horses	1,950 00
26	Durham cattle	1,730 00
28	Grade cattle	935 00
23	Berkshire swine	170 00
9	Tamworth swine	75 00
11	Yorkshire White swine	105 00
83	Fowls	83 00
	Bees and apiarian supplies	41 75
	Vehicles, including farm wagons and sleighs	536 00
	Farm machinery	2,237 00
	Farm implements	699 00
	Hand tools, hardware and sundries	397 50
	Harness	182 50
	Furniture for reception room and bedroom for visiting officials	217 00
	Furniture supplies and books for office	512 66
		$ 9,871 41

EXPERIMENTAL FARM, AGASSIZ, B.C.

9	Horses	$ 1,180 00
25	Durham cattle	1,665 00
19	Dorset horned sheep	207 00
2	Berkshire swine	85 00
4	Yorkshire White swine	155 00
36	Fowls	36 00
	Bees and apiarian supplies	5 45
	Vehicles, including farm wagons	180 00
	Farm machinery	620 75
	Farm implements	95 50
	Hand tools, hardware and sundries	133 30
	Harness	94 25
	Furniture for reception room and bedroom for visiting officials	141 75
	Furniture supplies and books for office	284 92
		$ 4,883 92

THOS. M. CRAMP,
Accountant.

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